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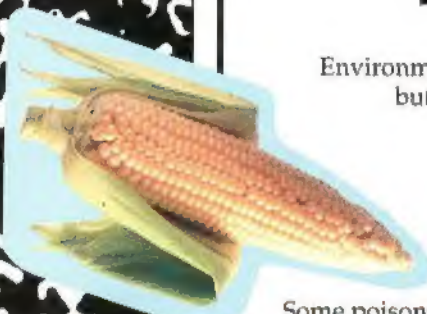
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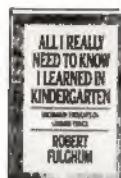
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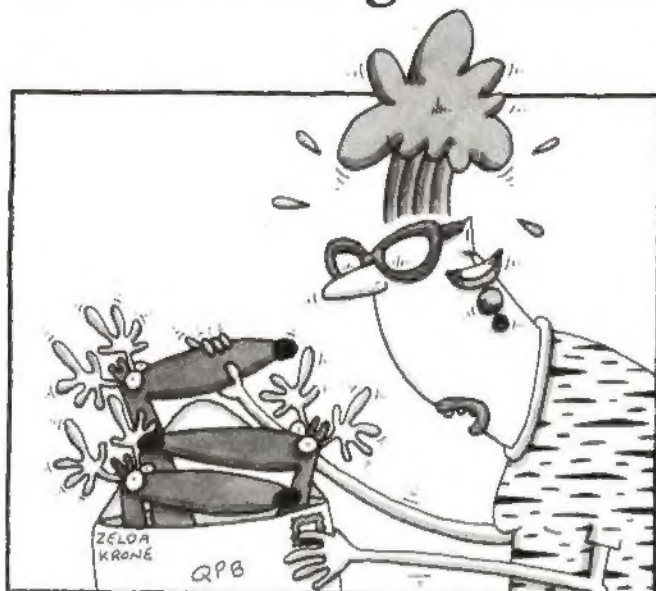
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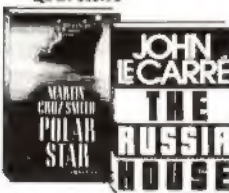
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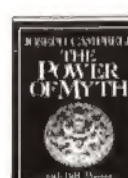
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## A Tough First Year

**T**he first issue of **GARBAGE** was dated September/October 1989, so this issue marks our one-year anniversary. I'm more committed than ever to the magazine, more engaged in the controversies and contradictions that accompany environmental awareness. But I would have to report, too, that it's been a tough year. I could not have predicted just how much this magazine would be a lightning rod for the anger, confusion, and distrust people feel. Call yourself an environmental publication and it's as if you took your place on a soapbox. The rotten tomatoes come whizzing by. Being human, sometimes I even take it personally.

We started out with a simple premise. I wanted this magazine to speak to the questions being asked by people around the country. I knew I didn't have the answers, but I thought it imperative that someone provide a forum for discussion, without the underlying agenda of a dues-paying membership, a board of directors, a political position. I knew a magazine couldn't change the world, but on the other hand, I suspected that our first publication, the Old-House Journal, in its 16 years had an impact on attitudes about old buildings. We'd done that by being truthful, talking plainly, and concentrating on practical help. No problem: For starters, we'd call the new magazine **GARBAGE** and everyone would see that it's written from a different point of view.

Early reaction was phenomenal. I'd hoped to print 50,000 of Vol. I No. 1; by the time we finalized the print run, it was 126,000. Without having mailed a single press release (we didn't have time), we were being reviewed and quoted and referenced everywhere. I smiled when reviewers called the name **GARBAGE** "a brilliant move," remembering the disgust with which it had been first greeted by environmentalists and media consultants. The magazine, by being unaffiliated and irreverent, seemed to fulfill others' ideas of what they wanted in a new environmental magazine.

Then reality started to hit. The reviews were great but we had problems at home — with staff and with readers. Maybe it's inevitable with a project that tries to beat its own path: Those who find they're not sure of their own direction quit. After some heated staff discussions about editorial policies, the managing editor exited. Then the art director left. Although readers were supportive, we got some hate mail, too. In the midst of all this, I got pregnant.

So, like the subject of garbage itself, year one was a complicated mix of personal and business ups and downs. Launching the magazine was a thrill. I felt high as a kite seeing our hard work pay off. Then, keeping **GARBAGE** going amid all the controversy, the special interests, and staff conflicts, while simultaneously starting a family, was another story. I wondered if I hadn't bitten off more than I could chew. Euphoria had turned to exhaustion, idealism to pessimism. I wasn't making anyone happy, least of all myself.

Then one day it hit me. Of course **GARBAGE** is controversial. Of course we're going to offend some readers, enrage others — and enlighten a few. **GARBAGE** isn't about simplistic things we can do to save the Earth. **GARBAGE** isn't paper vs. plastic or Greenpeace vs. General Electric. **GARBAGE** is about asking questions that don't have easy answers. **GARBAGE** is an open forum for varied points of view. It isn't placating, it's provocative. I'd hoped to elicit a strong reaction, and I did!

This issue is no different. Art Kleiner's first piece, in a series on corporate environmentalism, touches on a subject that environmentalists are leery of — environmentalism for motives beyond altruism. Bill Rathje's article on page 32 questions the nature of the garbage crisis.

Keep those cards and letters coming....

Editor

One year after the birth of **GARBAGE**, Patricia Poore gave birth again, this time to William Carl Thomsen. Congratulations, Patricia and Carl! —the Brooklyn and Gloucester staffs



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### **GARBAGE** The Practical Journal for the Environment

ISSN 1044 3061

Published bi-monthly for \$21 per year by Old House Journal Corp., 435 Ninth St., Brooklyn, NY 11215. Telephone (718) 788-1700. Subscriptions in Canada are \$29 per year, payable in U.S. funds. Advertising: (800) 356-9313. Newsstand Sales: (508) 283-4721.

Application to mail at second-class postage rates is pending at Brooklyn, New York, and additional mailing offices.

POSTMASTER: Send address changes to **GARBAGE** The Practical Journal for the Environment, P.O. Box 56519, Boulder, CO 80322-6519.

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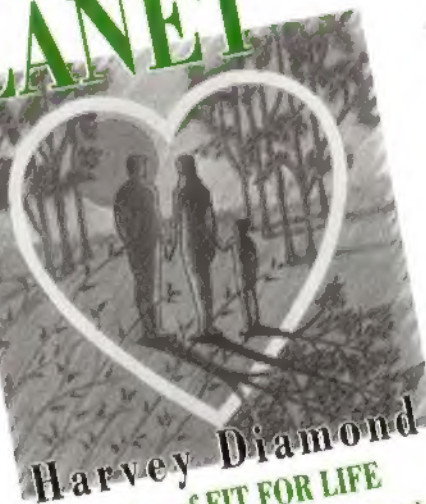
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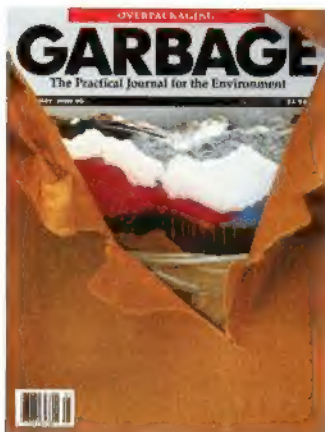


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## RECYCLED PAPER POINTS

I would like to point out a couple of sore spots in the article "Recycled Paper: Exploding the Myths" [May/June]. The article states, "Most recycling mills use bleaching chemicals that don't produce dioxins for residues left after deinking." This is misleading. In the EPA's "Bioaccumulative Pollutant Study," nine deinking mills were listed, having demonstrated dioxin contamination of fish downstream. Deinking agents were not specified in all cases, but at least three use hypochlorite. Dioxins, chloroform, and other organochlorines cannot form without a

chlorine atom with which to bond, therefore hydrogen peroxide makes a much better deinking agent.

Jacqueline Hunt  
Seattle, Wash

*As you point out, several high-grade deinking plants are using sodium hypochlorite for bleaching (not as a deinking agent). While this bleach is derived from chlorine, sodium hypochlorite is used in a high-alkaline environment, which prevents the chlorine molecules from breaking out of the compound to recombine into dioxins and furans. However, it can create chloroform, which makes the use of other bleaches more desirable. The bleaching issue should not be at cross-purposes with*

*recycling. Both are important for the creation of more environmentally sound paper production.* — Susan Kinsella

## ON DEGRADABLES

I was dismayed by one underlying assumption: that we must have plastic garbage bags in order to lead sanitary, meaningful lives. I am not that old (32) and I remember the pre-Hefty Bag days. We carried our groceries home from the store in brown paper bags. These bags then served their second life as liners for the kitchen garbage pail. It seems to me that many of our environmental problems [will persist if] people search for alternative ultimate conve-

niences rather than changes in lifestyle.

Lori Odell  
Alta Loma, Calif

"Degradeable Plastics" was an excellent overview and represented a lot of diverse views. The most salient point missed is that the degradable product is a binary system, not solely dependent on cornstarch [but also on a pro-oxidant]. In fact, the starch helps the pro-oxidant, while the pro-oxidant does not need the cornstarch to operate.

George Upton  
Market Manager,  
Ampacet Corp.  
Flowery Branch,  
Georgia

(Ampacet makes a cornstarch/pro-oxidant additive.)

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## PAPER GROCERY-BAGS

Because the market is responding so quickly, I want to update some information you presented [on grocery bags] in the excellent article, "The Packaging Challenge," [May/June]. [Our] 100-percent recycled-paper grocery-bags are now being used by hundreds of supermarkets since we introduced them to the industry in May. The vast majority of this paper consists of 70- to 100-percent post-consumer waste, with the remaining contents post-industrial fibers. Already, over 90 million bags have been shipped to customers on the East Coast and in the Midwest.

Recycled bags do not cost any more than virgin paper sacks, but they enhance our environment by saving landfill space, energy, trees, and they are recyclable again.

David Davis,  
Director of Marketing  
Duro Bag  
Manufacturing Co.  
Ludlow, Ky.

## PEOPLE, PEOPLE, PEOPLE

Regarding **GARBAGE**: I very much hope you do not neglect such important environmental organizations as Planned Parenthood, Zero Population Growth, Negative Population Growth, et al.

Amidst the Earth Day

hoopla, almost everyone ignored the crucial matter of human population. (Somehow, aversion to abortion has grown into an aversion even to consider the possibility that there may already be too many people, and that our little planet simply can't support a continually growing population.) Population control is absolutely necessary. It's not as obvious in the industrialized countries because [we] don't have the [constant reminder] of starving children and depleted soils. But it's actually even more important here, because we use so much more of the Earth's resources.

I don't understand why people are so touchy about it — after all, all plants and

animals reproduce, most of them in very much the same way we do. There's nothing uniquely human about it. It's just one more aspect of life that we've got to deal with if our planet is to remain habitable. I do love **GARBAGE** magazine. My husband is the subscriber, but I think I am the more avid reader.

Nan Lawler  
Fayetteville, Ark.

Want to dump on something, or recycle a bright idea? Unload on us. Letters should be short and to the point. Write to: **GARBAGE**, Letters to the Editor, 435 Ninth St., Brooklyn, NY 11215.

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## PROFILE

**W**here most people see garbage, Dan Knapp sees valuable resources. A Berkeley, California, resident with a lumberjack's build, Dan co-founded a profitable company based on the premise that we can recycle almost all of what we now dismiss as "garbage." His company, called Urban Ore, grossed over \$600,000 in 1989 by selling goods rescued from the trash bin.

Urban Ore's sales yard, occupying a paved lot just a few hundred yards from Berkeley's garbage transfer station, looks like a giant garage sale. Rows of furniture line one end of the lot: a sectional sofa with matching barstools, a mahogany sideboard, dressers, kitchen chairs — just about anything you'd need to furnish your apartment. Stacks of crates are crammed with sundry items: a muffin tin, hangers, a bottle of cologne, a tool kit, even a surfboard. Less

than 25 percent comes from workers sorting through city waste; the rest is dropped off by residents. "It's cheaper than paying the tipping fee at the transfer station," Dan explains.

Dan believes the residential and commercial discards he sells would all be landfilled if Urban Ore didn't exist. The company is an exemplary part of his crusade to convince people that "total recycling" is not only possible, but also profitable. He points to the wealth of potentially recyclable materials often trashed: metals like brass and copper that would command a high price if sorted by grade; concrete that could be ground into gravel for landscaping or pavement; lumber that could be cleaned and resold; and the kind of reusable merchandise he sells at Urban Ore. He and his wife Mary Lou Deventer have contracted with University of California Press to write a book that will describe ways to recycle almost everything we throw away.

Dan's entry into the world of trash wasn't typical of most salvage-yard operators. He holds a Ph.D. in sociology and was once a university professor. He undertook his journey from the groves of academe to the hills of landfilled refuse after he discovered the economic potential buried in garbage while hauling trash for a food co-op in Eugene, Oregon.

**H**e volunteered for the weekly trek to the dump because he owned the perfect vehicle for the job — a 1948 GMC flatbed named "Fred Jackson." There, he discovered a treasure trove of valuable materials like hardware and lumber. He began challenging himself to return from the landfill with as much material as he discarded, ignoring the signs warning that salvaging was illegal.

One day, Dan eyed a dump opera-

**Dan Knapp, former university professor turned salvage-yard operator.**



URBAN ORE/ VAN DEVENTER



tor frowning at him from across mountains of trash as he loaded discarded lumber onto Fred Jackson. Moments later, the man was charging him with a bulldozer — blade down. Dan leaped into Fred Jackson and slammed the door just as the bulldozer mauled the pile of lumber he had been collecting. The near miss left him shaken: "I couldn't believe that somebody was willing to kill to enforce a policy of needless destruction," he says.

After the bulldozer incident, Dan told himself: "Don't get mad, get even." He landed a job as head of the county office that was exploring ways



to solve the Eugene area's garbage glut.

Lane County (where Eugene is located) had just purchased a \$3.5 million refuse-derived fuel plant that was supposed to convert garbage to fuel for industrial boilers. After three months of study, he concluded that the plant would produce inferior fuel for a nearly nonexistent market, and that sparks from its garbage shredder could ignite flammable materials in the waste. He recommended that Lane County reduce its wastestream with labor-intensive recycling — like composting yard waste and pre-sorting metals. Convinced that the refuse-derived fuel plant would work, the commissioners fired Dan by cutting his funding. (Incidentally, the plant exploded in 1980, when a spark from the

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**Urban Ore, in Berkley, California, offers a treasure trove of materials retrieved from the trash bin.**



PHOTOS BY URBAN ORE/ VAN DEVENTER

shredder ignited toluene vapor from wood filler in a piece of plywood, according to Mike Turner of the Lane County Solid Waste Division, who was there at the time.)

Out of money and out of patience, Dan hitchhiked from Eugene to Berkeley with only a backpack and \$40. Three days later, he was working at the Berkeley dump, salvaging metal for \$4 per hour. At the time, he viewed himself as a "participant observer" — a sociologist who studies by doing. The dump environment — the haulers, operators, and waste — became his area of expertise.

In 1980, Dan and two garbage colleagues rented a lot near the San Francisco Bay waterfront for \$500 per month. They began selling building materials retrieved from the Berkeley dump. Profits from the sale of

salvaged scrap metal paid the first month's rent — hence the name "Urban Ore."

The company has grown rapidly from its humble origins. It now employs 16 workers at two salvage yards. The first lot, the Building Materials Exchange, sells salvaged doors, windows, bathtubs, and sinks to renovators, restorers, artists, and landlords. The other yard, called the Discard Management Center, offers everything from furniture to clothing to kitchen appliances. Customers range from "pack rats" (as one Urban Ore employee describes them) to antique dealers.

Dan's current job description is a world apart from his early work in the salvage business, when he burrowed into landfills amidst ample rat populations and dive-bombing seagulls. These days, he spends most of his time confronting the type of office work that plagues every entrepreneur: spreadsheets and payrolls, lawyers and insurance agents. He jets across the country to expound on the untapped possibilities of recycling. At a recycling conference in Los Angeles one weekend, and a legislative conference in Chicago two weeks later, Dan Knapp preached his primary motto: "Waste isn't waste until it's wasted."

— Jackie MacDonald

*Jackie MacDonald, a freelance writer with a master's degree in environmental engineering, lives in Springfield, Illinois; her writing has appeared in the Illinois Technograph, the Old-House Journal, and the Daily Illini.*

## GARBAGE DICTIONARY

**Geomancy** (noun). The term has its roots in the Greek words *gy*, meaning earth, and *mancie*, which translates into knowledge. Over the centuries, geomancy has acquired numerous applications. For example, nineteenth-century European thinkers used the term to translate the Chinese *feng-shui*, the complex, ancient art of orienting and designing buildings and communities to harmonize with nature. *Feng-shui* practitioners study the natural history of a site before building on it, or position rooms or windows toward particular constellations.

Today, the term geomancy has been repopularized to address an amorphous New Age philosophy regarding our psychological relationship with the environment. In his book, *Earth Ascending*, Jose Arguelles defines geomancy as "the knowledge of the Earth as a planet body, a complete living organism whose elemental processes and rhythmic cycles are intimately connected to our own perceptual structures and biological functions." Sound a bit lofty? Frankly, we'd like Mr. Arguelles to write a sequel and call it *Earth Descending*, prosaic definition of geomancy included.

— Ginia Bellafante



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# Cities Fight for Right to Recycle

If raccoons aren't fighting over the contents of your garbage can, waste managers may be. As recycling gathers momentum, some cities and towns are finding they must first liberate their recyclables from the grip of a contracted garbage agreement for a waste-to-energy incinerator.

The New York town of Hempstead, Long Island, is in just such a bind. If Hempstead meets a recycling goal of 25 percent and composts its yard waste, it probably couldn't meet its contractual obligation to send 540,000 tons per year to the local American Ref-Fuel incinerator. As a reward for reducing its wastestream, the town would face financial penalties, and would also have to pay for landfilling the ash generated by trash it would

have to import from elsewhere to make up for the shortfall. "We're promoting recycling because we're environmentally aware," says Hempstead resident Shelley Lotenberg, who's been questioning the need for a waste-to-energy incinerator for 10 years. "But for us to recycle, [the promised] garbage will have to come in from another town."

All of New York state is approaching a similar quandary. According to the New York Public Interest Research Group, the state will have a tough time achieving a 50-percent waste reduction and recycling goal by 1997, when about 50 percent of its garbage is slated for incineration. Because some of the wastes that incinerators count on for fuel are excellent candi-

dates for recycling or composting — paper, plastics, and yard wastes — NYPIRG warns that both obligations can't be balanced. Further up the East Coast, 33 municipalities in Maine, which cooperatively own two incinerators, are fishing for solutions that will enable them to meet the state's 50-percent recycling goal for 1994, while continuing to feed the incinerators enough garbage to fulfill their contracts with electric companies.

The East Coast has no monopoly on sticky garbage obligations. Los Angeles is entering into a 50-year agreement that encourages landfilling over all other waste-disposal alternatives. Under the plan, which will turn a chain of L.A. canyons into hills of garbage, the city will pay a \$1 surcharge on every ton of trash it contributes — with a minimum charge of \$6,000 a day, even if the city sends less than 6,000 tons to the landfill.

Los Angeles currently produces

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about 16,000 tons a day, so 6,000 tons seems like an achievable obligation. But private haulers control the destiny of all but 5,000 tons, meaning that they can dispose of 11,000 tons by whatever alternative is most profitable. Furthermore, to meet the state goal, by the year 2000 the city would have to recycle 50 percent of its trash. If a lucrative breakthrough in recycling, composting, or another garbage technology should lure private haulers away from the new landfill, Los Angeles would be hard pressed to meet its commitment.

Outside San Francisco, the strange future of garbage battles is taking shape as the town of Walnut Creek and its waste hauler debate the very definition of garbage. In 1988, the town hired an outside firm to collect its recyclables. The local hauler, Valley Waste Management, objected, maintaining that its contract with the town gave it the right to collect and dispose of every ton of garbage produced, in-

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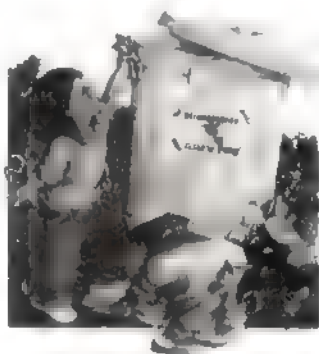
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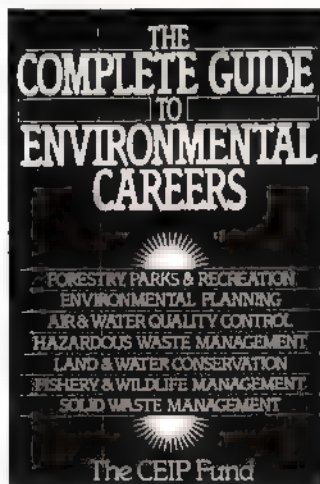
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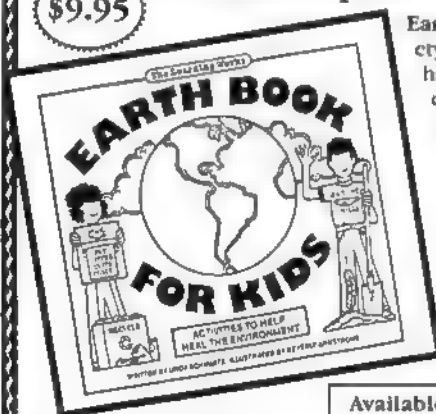
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## FOR THE RECORD

**"So you use recycled toilet paper. Not many people will know."**

**Rick Forsythe,**  
Ontario recycled-paper stationery merchant, arguing that your environmental commitment will be more apparent if you buy his wares.  
(*The Graphic Monthly*, November/December)

cluding recyclables.

"All of a sudden no one knows what 'garbage' means," complains Tim Argenti, special projects manager for Valley Waste's new owner, Waste Management of North America, Inc., which has perpetuated the debate. Assistant City Manager Ron Gould, who estimates Waste Management has lost six percent of the wastestream to recycling, replies: "More [garbage] is

better, in their eyes."

It was a lack of landfill space and foresight which got many communities into the jams they're in now. As their leaky landfills reached capacity in the 1980s, many municipalities belatedly looked for disposal options. What they found was enormous public resistance to new landfills and skyrocketing tipping fees. As gift horses appeared — a new landfill or incinerator — communities leaped for them, without looking them in the mouth.

Once a community has a multi-million dollar incinerator, whether it's publicly or privately owned, the mortgage must be paid. And the only way to pay it is to keep the garbage coming in and the electricity flowing out. As in Los Angeles and Hempstead, waste managers guarantee their supply by charging a community for minimum tonnage — regardless of whether the community delivers. Many, like the Ogden Martin incinerator in Babylon, New York, reserve the right to charge additional penalties to make up for their lost revenue if garbage dwindles. And the obligation often lasts for 20 years.

Now that they're locked to these agreements, what can communities do? Towns with hungry incinerators can sell space to municipalities that have extra trash, but then must deal with the high political and economic cost of landfilling someone else's incinerator ash. One Maine community is even considering building a barn where capricious summer-tourist trash could be surreptitiously round out the lean winter months.

Hempstead has been hunting for a town that's willing to send its trash to the plant and in turn accept all the ash that Hempstead now pays \$140 per ton to send to Buffalo. And if Hempstead can't work a deal? After two years of insufficient tonnage, American Ref-Fuel can itself contract with an outside town, and Hempstead will be left holding the ash.

As these dramas unfold across the country, some communities are hustling to buy time. Faced with an incinerator proposal, a group of citizens in North Hempstead, N.Y., has developed a plan to recycle 70 percent of the town's waste. The Citizens to Save Hempstead Harbor will have to convince the New York State Department of Environmental Conservation to leave the local landfill open four extra years, until 1994, in order to gain time to implement their plan. After that, they argue, North Hempstead won't have any trash worth scrapping over.

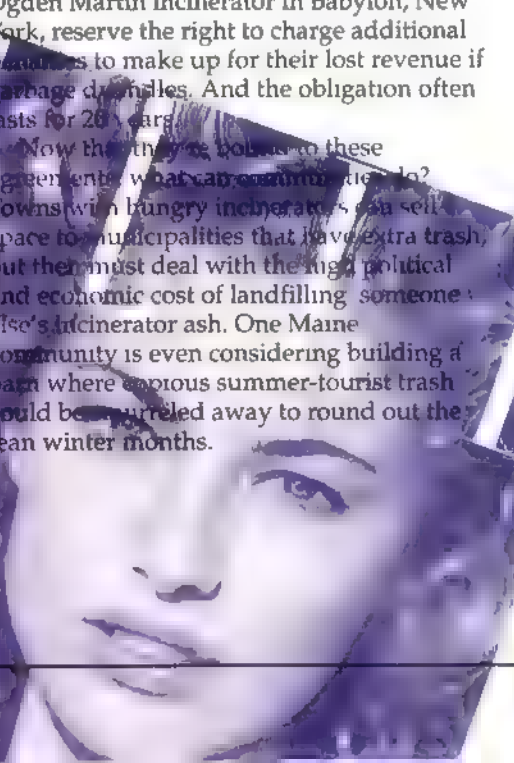
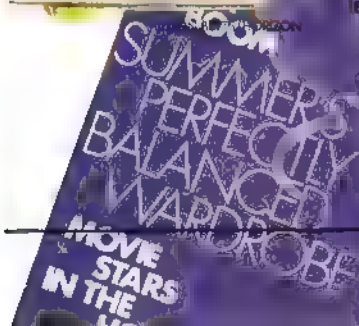
— Hannah Holmes

## •What's Wrong with This Picture?

**E**nvironmentalism is everywhere these days. But apparently it's not cool to take it all that seriously. What's the expression — "consistency is the hobgoblin of little minds"?

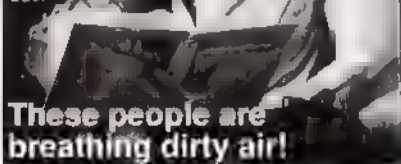
ELLE magazine's June *Newsbreak* column featured a 51-line writeup touting "eco-inspirations" that say "green is groovy." Cases in point: clothes with a conscience, motifs from the natural world, profit proceeds to environmental groups, all for the good of "rain forests disappearing by the minute and garbage mounting Babel-like in the sky." This was followed by a review of the handbook *Shopping for a Better World*, and an announcement of a live-concert TV show *Earth '90: Children and the Environment*.

Have even fashion magazines committed to eco-awareness? Only as a trendy news item. The same page gushed over Kodak's disposable cameras (see *GARBAGE*, Jan./Feb. 1990, p. 64), with lines like "ideal for group portraits" and "armored in durable, weather-resistant plastic, [it's] perfect for underwater photo-ops..."



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# 3

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- 2. TAKE THE PLEDGE**
- 3. ADOPT**

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## FOR THE RECORD

**"Then [Sylvester Stallone] may do Rambo IV — but only, says a spokesperson, 'if it deals with ecology and the environment'."**

(Newsweek, May 28)

## • Dirty Laundry

If you went to last spring's Earth Day festivities in stone- or acid-washed jeans, you too may have been guilty of eco-oversight. The pumice that softens and fades this popular fashion staple is strip-mined, which razes forests, threatens water tables,

and requires the removal of up to three feet of topsoil.

Stonewashed jeans are a hot environmental item in the Jemez Mountains, 40 miles west of Santa Fe, New Mexico. There, local environmental groups appealed the U.S. Forest Service's 1989 decision allowing the Copar Pumice Company to strip-mine 33 acres of the Santa Fe National Forest. The appeal was denied — the Forest Service maintaining that mining would not significantly scar the conifer-clad slopes and mountain streams. The USFS believes the mitigating measures it requires miners to take (such as replacing soil and replanting botanicals) sufficiently protect the land and water. Local environmental groups are also backing a legislative proposal that would preserve thousands of acres in the Santa Fe Forest — including the 33 acres where stripping is currently permitted — by designating the parcel a national recreation area. Meanwhile, the Jemez Action Group has orchestrated a national boycott of stone- and acid-washed clothing. Gary Schiffmiller, spokesman for the group, says that "strip-mining for luxury items is unjustifiable."

## • Recycling's Virgin Flight

We've previously noted that jet planes deliver more than weary passengers when they complete a flight (*In the Dumpster*, May/June) — most also unload mounds of packaging waste. Not too long ago, Virgin Atlantic Airways discovered that every international flight enters England

Angeles Airport jettisons approximately 1,000 pounds of landfill-bound trash.

When VAA inaugurated service between London and Los Angeles last spring, it implemented a pilot recycling program on the L.A. end — a daunting task considering that the federal Food and Drug Administration requires that all jetsam produced during international air voyages must be baked to destroy insects and bacteria before it is disposed. Despite the tough health restrictions, VAA's experimental one-week program really took off. The airline salvaged and recycled 22 percent of its in-flight trash. If VAA's planning stays on schedule, it will soon launch a permanent recycling program that may include other airlines.

## • New York's Mean Greens

New York City's recycling effort is typically hard-nosed. Initiated in July 1989, the city's recycling law now presides over 1.5 million households. Modifying the waste habits of 7,352,700 people — each of whom generates an average of five pounds of trash a day — requires draconian measures, especially when you consider that many New Yorkers live in high-density, high-rise neighborhoods. So how does the DOS ensure that New Yorkers don't stealthily include recyclable glass bottles and newspapers with the Styrofoam and steak bones that pile up in their garbage pails? Simple: It arms its sanitation police with .38 caliber revolvers and, in a break with precedent, permits them to enter onto private property.

Trouble is, some New Yorkers blithely discard their designated non-trashables out of ignorance, not indifference. While the DOS has beefed up its sanitation police force to 133 members, the outreach staff charged with teaching New Yorkers how to recycle remains disconcertingly tiny. A mere 46 are responsible for changing the waste patterns of millions. Not surprisingly, recycling information is hard to come by. In one Brooklyn neighborhood, plastic recycling bins were dumped in front of stoops with no explanation. The type of waste that's supposed to go into the bins, and when it will be picked up, is anybody's guess.



## On the Beach, Road, & Town

### Litter in the USA

Percent of convenience-item packages littered:

**2 - 5**

Pieces per mile visible to person standing:

**1,457**

Pieces per mile visible to person kneeling:

**5,828**

Cost to remove and dispose of one piece of litter:

**9 cents**

Cost to remove 5,828 pieces:

**\$524.52**

Average decrease in city litter after three years in the Keep America Beautiful program:

**49%**

Sources: Litter expert Daniel Syrek and Keep America Beautiful

### NYC Waste Disposal Then and Now

1887		1989	
Dumped at sea .....	<b>73%</b>	Volume	Tons per day
Shoreline filling.....	<b>18%</b>	Landfilled	<b>81%</b> <b>18,271</b>
Landfilling (inland).....	<b>6%</b>	Incinerated	<b>12.5%</b> <b>845</b>
Dumped in river.....	<b>3%</b>	Recycled	<b>6.5%</b> <b>1,089</b>
Source: New York Historical Society		Sources: <i>The New York Environment Book</i> , Island Press, and the NYC Department of Sanitation	

### Annual Amount of Garbage Generated Per New Yorker

1900: **1,188\*** pounds

1989: **1,825** pounds

\*Ash comprised 83% of the total.

Sources: *Garbage in the Cities*, Texas A & M University Press, *New York Environment Book*, Island Press

### Fun Facts

Daily waste per hotel room (in Florida):

**.5 to 28 pounds**

(Central Florida Hotel and Motel Association)

Number of 2-liter plastic soda-bottles recycled to stuff one men's ski vest:

**5**

Number of 2-liter bottles made each year:

**4,700,000,000**

(NAPCOR, Johnson Controls, Inc.)

Garbage generated in South Windsor, Conn. (pop. 23,000) daily:

**66 tons**

...in the twin towers of New York's World Trade Center:

**65 tons**

(South Windsor Public Works Dept.; World Trade Center)

Number of horse carcasses collected in 1880 in NYC:

**15,000**

(*Garbage in the Cities*, Texas A & M University)

### States With Most Beach Waste

Texas.....	<b>1,926</b> lbs/mile
Louisiana.....	<b>1,641.8</b> lbs/mile
Maryland.....	<b>1,636.4</b> lbs/mile
Hawaii.....	<b>1,192.3</b> lbs/mile
New York.....	<b>1,187.3</b> lbs/mile
North Carolina.....	<b>740.9</b> lbs/mile
Mississippi.....	<b>620</b> lbs/mile
California.....	<b>578.4</b> lbs/mile
New Hampshire.....	<b>577.1</b> lbs/mile
Florida.....	<b>439.1</b> lbs/mile

Source: Center for Marine Conservation

### Beach Waste Collected in 1989\*

	Volume:	Weight (in tons):
Plastic.....	<b>63%</b>	<b>541.8</b>
Glass.....	<b>11%</b>	<b>94.6</b>
Metal.....	<b>10.6%</b>	<b>91.16</b>
Paper.....	<b>9.8%</b>	<b>84.28</b>
Wood.....	<b>2.4%</b>	<b>20.64</b>
Rubber.....	<b>2.0%</b>	<b>17.2</b>
Cloth.....	<b>1.3%</b>	<b>11.18</b>

\*Litter cleaned from 2,946 miles of U.S., Mexican, and Canadian shoreline.

Source: Center for Marine Conservation

ILLUSTRATIONS: ROBERT PIZZO



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**Q:** What can we do with window glass? How can it be recycled? The argument here is that leaded window panes can't be mixed with old bottles. Is that correct?

*Galen Beery  
Venice, Calif.*

**A:** Windowpanes — unless they're stained — do not contain lead. Nevertheless, they are difficult to recycle. New Jersey's

**None of New Jersey's 73,000 tons of plate and auto glass is now being recycled.**

wastestream, for instance, includes 73,000 tons of plate and auto glass, but virtually none of it is recycled. The reason? The extensive processing infrastructure and existing markets for glass containers haven't been established for window glass. Also, because it differs in composition from container glass, window glass isn't used in the reproduction of bottles and jars.

Surprisingly, window glass is rarely recycled as windowpanes, either.

In order to recycle windows, a manufacturer must know the glass' specific physical and chemical characteristics. Window glass may vary significantly in formulation from manufacturer to manufacturer. Some companies may use tints, others may use special sprays that block out the sun's ultraviolet rays. A manufacturer who chooses to use old window glass would have to first subject it to a costly analysis to ensure that it complied with the chemical makeup of the company's specific glass type.

One way that window glass can be recycled is by adding it to the supply of raw material used in fiberglass production. Owens Corning, a giant in the fiber-

glass industry, claims that three to four percent of its feedstock is comprised of plate or auto glass. Because trace minerals used in certain types of glass are incompatible with the fiberglass production process, manufacturers often purchase scrap directly from glass makers who can provide them with content information. Once it is chemically analyzed, some homeowner glass purchased through recyclers or collectors may also be used.

The first step in finding out how to unload your old window glass is to contact your municipal department of sanitation in the unlikely event that it sponsors a glass-collection program that includes windowpanes. Another option is to contact glass processors directly (check your Yellow Pages for listings) to see if they'll accept old windowpanes.

Unfortunately, none of the seven southern California glass processors we called accept windowpanes from homeowners. Residents in other parts of the country may have better luck. The Bassichis Company, which maintains 11 facilities across the U.S., and the Florida Glass Reclaiming Corp. both take window glass directly from consumers. For more information contact Bassichis at their Cleveland headquarters (216) 621-4181, or Florida Glass at (813) 758-7773.

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**Q:** Many people in my area have woodstoves, and use them to burn some of their trash. What is safe to burn and what is not?

Pam Ward  
Randolph, Vt.

**A:** The study of how stoves handle fuels other than wood is just beginning, but industry scientists and the Environmental Protection Agency already agree that the catalytic combustor in some newer stoves (allowing for more complete burning of gasses) may be "poisoned" by non-wood fuels. Neither new nor older woodstoves should be treated like a solid-waste incinerator.

Woodstoves, especially newer, tighter ones, burn hundreds of degrees cooler than incinerators, and therefore aren't as good at destroying such by-products as carbon soot and gasses like carbon monoxide and hydrocarbons, some of which are potentially car-

cinogenic. Unless your stove has a catalyst, these wood by-products will pollute the great outdoors. (If your stovepipes leak, they'll pollute the great indoors, too.) To minimize your stove's emissions, keep the burning temperature high. Clay-coated magazine paper, tea bags, and other hard-to-burn items will lower the fuel-box temperature and impede combustion efficiency. This will allow more than the usual amount of soot and gasses to fly up the chimney unburned.

Researchers also concur that some substances are inherently dangerous to burn. Treated wood is one. Greenish "Wolmanized" wood, used to build outdoor decks, will release chrome and toxic arsenic when burned. Wood treated with tan-colored pentachlorophenol for industrial uses will release chlorine that may form extremely poisonous dioxins and furans. Not having tested the combustion of structural-grade plywood or chipboard, the EPA can only speculate that burning them in woodstoves may release aldehydes, a family of gasses that includes carcinogenic formaldehyde.

Polyvinyl chloride (PVC), the plastic used to make things like food wrap, shower curtains, and vegetable oil bottles, is another problem. When burned, its chlorine may contribute to dioxins, and may also work

**Wolmanized or treated wood releases chrome and toxic arsenic when burned.**

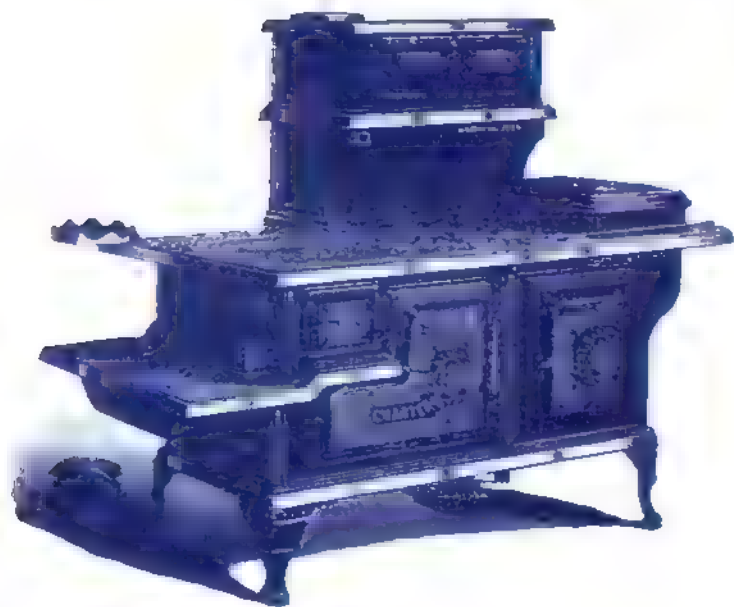
with hydrogen to form hydrogen chloride gas, which turns into a strong acid when combined with moisture. The EPA is most familiar with PVC, but they recommend you don't burn any plastics.

As for paper, black newspaper ink is harmless carbon. However, colored newspaper inks usually contain copper and barium. Magazines, brochures, packaging, and gift wrap are likely to use even more ink and metals in printing and processing. If burned metals don't go up the chimney, they remain in your ash and could contaminate your garden if spread there.

Woodstoves are designed and engineered to burn wood — that's what they do most cleanly and efficiently.

## GOT A QUESTION?

Write to: Questions Editor



# THE HISTORY OF **GARBAGE**



## **ARCHAEOLOGISTS BUST MYTHS ABOUT SOLID WASTE AND SOCIETY**

Subject \_\_\_\_\_

Writer WILLIAM L. RATHJE

**G**ARBAGE IS NOT MATHEMATICS. To understand garbage you have to touch it, feel it, sort it, smell it. You have to pick through hundreds of tons of it, counting and weighing all the daily newspapers, the telephone books, the soiled diapers, the Styrofoam clamshells that briefly held hamburgers, the lipstick cylinders coated with grease, the medicine vials still encasing brightly colored pills, the empty bottles of scotch, the cans of paint and turpentine, the forsaken toys, the cigarette butts. You have to count and weigh all the organic matter, the discards from thousands of plates: the noodles and the Cheerios and the tortillas; the hardened jelly doughnuts bleeding from their wounds; the pieces of pet food which have made their own

gravy; the half-eaten bananas, mostly still with their peels, black and incomparably sweet in the embrace of final decay. You have to confront sticky green mountains of yard waste and slippery brown hills of potato peels and brittle ossuaries of chicken bones and T-bones. And then finally there are the "fines," the vast connecting soup of indeterminable former nutrients, laced with bits of paper and metal, glass and plastic, which suffuse every landfill like a kind of lymph. The fines, too, must be gathered and weighed.

To an archaeologist like myself, garbage trails mankind in an unbroken line from the first flakes of flint left by tool-makers a million years ago to the urine bags left by astronauts in outer space.

**F**or most of the last two million years, human beings left their garbage where it fell. This disposal scheme functioned adequately because hunters and gatherers frequently abandoned their campgrounds. When modern hunter-gatherers, like the aborigines of the Australian outback, are provided with government housing, one of the immediate problems they face is that of garbage disposal. Aborigines typically begin



**IT IS DIFFICULT TO APPRECIATE HOW APPALLING WERE THE CONDITIONS  
OF DAILY LIFE... THE STUPEFYING LEVEL OF FILTH ACCEPTED AS NORMAL  
WAS RAISED HORRIBLY BY THE INDUSTRIAL REVOLUTION.**

their settled lives by trashing their houses, leaving debris in all the rooms and throwing it out the windows and doors. As such behavior suggests, man faced his first garbage crisis when he became a sedentary animal.

That brings us to the first important truth about garbage: There are no ways of dealing with it which haven't been known for many thousands of years. As the species has advanced, people have introduced refinements, but the old ways are fundamentally still the only ways, and they are four: dumping garbage, burning garbage, turning garbage into something that can be used again, and minimizing the volume of material goods (future garbage) produced in the first place ("source reduction," it's called)

**G**iven the choice, a human being's first inclination is always to dump. From prehistory through the present day, dumping has been the means of disposal favored everywhere, including the cities. Archaeological excavations of hard-packed dirt and clay floors usually recover a multitude of small finds, suggesting that a great deal of garbage was just left on the floor where it fell, or was brushed into a corner. In 1973 a civil engineer with the Department of Commerce, Charles Gunnerson, calculated that the rate of uplift due to debris accumulation in the ancient city of Troy was about 4.7 feet per century. If the idea of a city rising above its garbage at this rate seems quaint, it may be worth considering that "street level" on the island of Manhattan is fully fourteen feet higher today than it was when Peter Minuit lived there.

At Troy and elsewhere, of course, not all trash was kept indoors. The larger pieces of garbage and debris were thrown into the streets where semi-domesticated animals (usually pigs) ate up the food scraps while human scavengers, in exchange for the right to sell anything useful they might find, carried what was left to vacant lots or to the outskirts of town, where it was sometimes burned but more often simply left. The image of sulfurous "garbage mountains" in the Third World is repelling and almost a cliché, but the people who work these dumps, herding their pigs

even as they sort paper from plastic from metal, are performing the most thorough job of garbage recycling and resource recovery in the world. What's an enlightened, right-thinking environmentalist to say? The garbage mountains point up another important truth about garbage: Efficient disposal is not always completely compatible with other desirable social ends — due process, human dignity, economic modernization. In a liberal democracy, these other ends compete for priority. In the United States, a garbage problem is in some respects just the modest price we pay for having done many things right.



**Rapid urban growth during the early-19th century left "dustmen" with their hands full.**

It was the threat of disease, finally, that made garbage removal at least partially a public responsibility in Europe and the U.S. In the United States, the path was pioneered by Colonel George E. Waring, Jr., the "Apostle of Cleanliness," who became the Street Cleaning Commissioner of the City of New York in 1895 and set up the first comprehensive system of refuse management in the country. Col. Waring and his 2,000 uniformed White

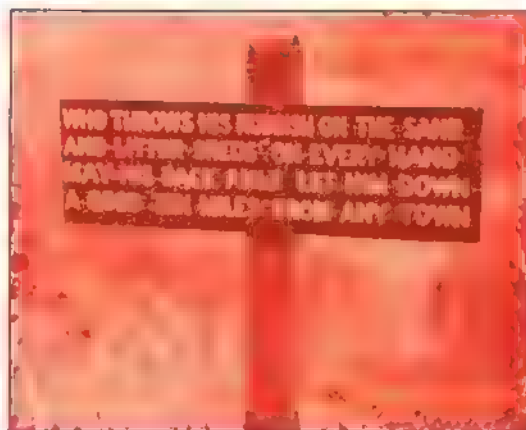
Wings cleared the streets of rubbish and offal and carted off the refuse to dumps, incinerators, and, until the affluent owners of shorefront property in New Jersey complained, the Atlantic Ocean. Waring's powerful image as protector of the public health influenced communities everywhere. Taking the long view reminds us of one more important fact about garbage: Ever since governments began facing up to their responsibilities, the story of the garbage problem in the West has been one of steady amelioration, of bad giving way to less bad and eventually to not quite so bad.

## How Much Garbage?

It stands to reason that something for which professionals have a technical term of long standing — *solid waste stream* — should also have a precisely calibrated volume attached to it. But the fact is that estimates of the amount of garbage produced in the United States vary widely.

**D**uring the past 15 years, The Garbage Project has handsorted and recorded modern household refuse in Tucson, Phoenix, Milwaukee, New Orleans, and Marin County (Calif.). By some happenstance, our sample neighborhoods — white, hispanic, black, low income, middle income, upper income — all discarded less than the prevailing national averages for residential refuse. As a result, I became interested in the way national averages are calculated. I found that there are limits on the accuracy of material measurements because of the biases of the researchers and the logistical constraints involved in data collection, analysis, and reporting.

Since there is no way to measure or weigh more than a fraction of what is actually discarded, all studies take short cuts. Some have tried to measure refuse in



Seaside village, 1936.

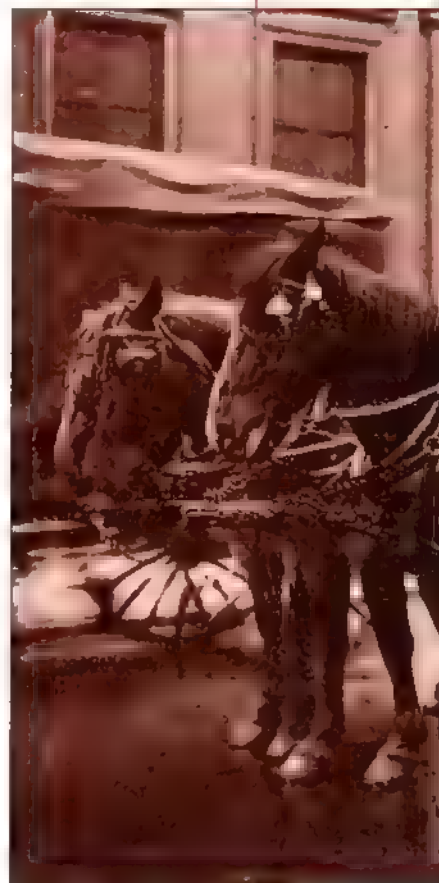
ten or 20 cities and then extrapolate findings to the nation as a whole. These studies suffer from acknowledged biases in data collection: Their informants were garbage haulers who had a vested interest in high figures. And sample sizes were small.

**A**nother estimation technique, the "materials-flow" method, doesn't examine garbage at all. Instead, it looks at industrial production, distribution, and sales

records and applies assumptions about discard patterns to determine the rate at which materials enter the solid waste stream. The problem here is that the assumptions are largely untested. The study most quoted for current generation rates, for example, assumed that the maximum useful life of major household appliances is no more than 20 years, after which time the appliances are discarded. That assumption ignores the substantial trade in used durables, which supplies many low-income households with appliances and is a source of parts no longer carried by standard dealers. Such untested assumptions abound.

Perhaps it should not have been a surprise that hands-on sorts produced figures consistently below accepted estimates. Nor should it be shocking that over the past two decades many incinerators were over-sized beyond their actual refuse intake, or that a 1981 column in *Public Works* asked, "Where has all the refuse gone?"

Even though today most of us believe we are in the midst of a "Garbage Crisis," we don't really know how much garbage we actually generate every day or every year. We don't even seem to know if the quantities discarded are growing or shrinking. My own view is that the higher estimates of garbage generation (frequently reported as five to eight pounds per person per day) significantly overstate the problem. Garbage Project studies of actual refuse reveal that even three pounds of garbage per person per day may be too high an estimate for many



In the early-20th century, street sweepers replaced hogs and the garbage pickers.



**THE BALTIMORE SUN RECENTLY CLAIMED THAT BALTIMORE GENERATES  
ENOUGH GARBAGE EVERY DAY TO FILL ORIOLES' STADIUM TO A DEPTH OF  
NINE FEET — A BALLPARK FIGURE IF EVER THERE WAS ONE.**

parts of the country. A weight sort of garbage in Milwaukee in 1978-79 yielded a weight of one-and-a-half pounds per person per day, a result that has been roughly corroborated by weight sorts in other communities. Americans are wasteful, but to some degree we have been conditioned to think of ourselves as more wasteful than we truly are — and certainly as more wasteful than we used to be. The evidence of our senses reinforces such perceptions. Fast-food packaging is ubiquitous and conspicuous. Planned obsolescence is a cliché. Our society is filled with symbolic reminders of waste. What we miss is what is no longer there to see. We do not see the 1,200 pounds per annum of coal ash which every American generated at home at the turn of the century and which was dumped usually on the poor side of town. We do not see the hundreds of thousands of dead horses which once had to be disposed of by American cities every year. No, Americans are not suddenly producing more garbage. On a per capita basis, our record is, at worst, one of relative stability.

### **The Role of Behaviors**

The root problem in assessing the true magnitude of garbage accumulation is in the nature of garbage itself. Unlike the evidence of other social problems, be it a human one such as poverty or an aesthetic one such as bad architecture, the evidence of specific pieces of garbage disappears from one day to the next. People put their garbage in the can under the sink and then someone TAKES IT OUT. The garbage that is taken out is eventually left at the curb and then IT IS GONE. Garbage passes under our noses virtually unnoticed, the constant turnover inhibiting perception.

**W**ith the permission of the sanitation division of the city of Tucson, my students and I have during the past 15 years examined the garbage of thousands of households. The Project has conducted studies designed to compare how people say they behave with how the garbage they discard says they behave; or, to put it another way, to compare what people say they throw away with what they actually throw away. Such detailed studies require that the interview responses of any household be matched against its garbage over a period of several weeks.

As you might suspect, people are an utterly unreliable source of information. What people claim in interviews to have purchased and used, eaten and drunk, recycled and wasted, almost never corresponds directly to the packaging and debris in their garbage bags.

If a behavior has a generally positive public image, it is over-reported. People report eating far higher quantities of high-fiber cereals, vegetable soups, and skim milk than the boxes, cans, and cartons they throw out would suggest. By the same token, if a behavior is seen in a negative light, it is under-reported. Informants drastically deflate the volume of alco-



holic beverages, breakfast pastries and desserts, and high-fat foods they consume. One common form of distortion results from what might be called the Good Provider Syndrome: Heads of households usually estimate that their families go through a great deal more food and other goods than one can actually find evidence for in the family's garbage. On the other hand, when asked to report their own diets, most people succumb to the Lean Cuisine Syndrome and report smaller portions and fewer fats and sweets than their garbage indicates. If you want to know how much alcohol people drink at home, don't ask them. They will typically under-report by 40 to 60 percent.

**P**eople's unpredictable behavior can have a direct impact on any attempt to change their discard patterns. For example, in California's Marin County, 88,000 households produce about 64,700 tons of hazardous materials each year. The county began sponsoring "collection days" when residents are encouraged to bring household hazardous wastes to a centralized location. To determine the efficacy of the Toxics Away! Day held in 1986, The Garbage Project sorted Marin household refuse for one month before and two months after the event. The



**A rubbish carter's business card, 18th-century style.**

results were not at all what we (or the County) expected. The refuse discarded *after* the collection day contained more than twice the quantity of hazardous materials which we had found discarded in refuse samples examined before the collection day. Why? The collection was held on only one day with no future collections announced. Most likely some citizens, who had been made aware of their household toxic products through publicity but had missed the actual collection, decided to get rid of their hazardous wastes through normal channels — at the curb.

Or let's look at the realities of changing behaviors that would facilitate, say, recycling. Let's say that the demand for recycled paper, plastic, aluminum, and glass was insatiable [... which, Prof. Rathje would agree, it is not. More in an upcoming article — the eds.]. How much garbage would Americans be prepared to recycle? If Americans were Germans or Japanese, the answer might be alot. Germans are furnished by local governments with three different trash containers, and they "source separate" their garbage to make recycling easier. In Japan, citizens are required to separate their garbage into at least seven and in some places as many as twenty categories to expedite re-use. In America, the only factor that could conceivably drive a

## THE GARBAGE PROJECT: METHODS AND FINDINGS

by Douglas C. Wilson

**F**ar from ignoring our wastes, we Americans are obsessed with our garbage. Garbage has become a powerful symbol for everything and everyone that is bad, unhealthy, evil, or uncouth, from bad computer programming ("garbage in, garbage out") to our favorite snacks ("junk food"). We even associate human personality with garbage: An inferior social group is referred to as "trash," and the noted garbage performance artist Laura Lee Coles has detailed our American fixation on

"disposable relationships."

While ancient and modern perceptions of garbage have often been negative, there is at least one group of people who find great intrinsic value in refuse: archaeologists. They study sites, examining material items to reconstruct past human behaviors, perceptions, and ideology. Most of the items found on archaeological sites are the discarded materials that remained after the site was abandoned — in other words, refuse.

I won't concern myself here with ancient civiliza-

tions, however, but rather with the archaeologist's unique perspective on modern society. To a few of us at the University of Arizona, modern garbage deserves as much attention as ancient garbage does. Refuse is a powerful source of data with which to study our own society and modern problems. In 1973, Dr. William Rathje and a few of his colleagues and students decided to apply the techniques of archaeology to the study of modern refuse. This was the origin of The Garbage Project (which we also call Le Projet du

Garbage). Since those early years, a great deal of data has been collected and analyzed by the Project. Beyond strictly archaeological issues, the Project has broadened its scope to look at a wide range of modern problems, including recycling, household hazardous wastes, and landfill composition and decomposition. From these research directions, we've come to several general conclusions about modern municipal solid wastes:

**WE NEED A BETTER UNDERSTANDING OF THE THREE COMPONENTS.** Modern refuse, like



## BAGS WITH HEALTH-FOOD PACKAGES ALSO CONTAIN WRAPPERS FROM FAST FOOD AND CANDY BARS. OUR GARBAGE IS A GRAPHIC WITNESS TO THE INCONSISTENCY OF OUR REAL-WORLD BEHAVIORS.

systematic recycling effort is money. Money is the reason why junk dealers pay attention to some kinds of garbage and not to others, and it is the reason why most people return bottles and cans to supermarkets, and newspapers to recycling centers, instead of just throwing them away. If recycling does not make economic sense to the actors at every link along the great garbage chain, it simply won't happen.

I belabor this point because it is so often overlooked, and because there are studies that seem to suggest — erroneously, I think — that for noble motives alone people would go to considerable lengths to make recycling an integral part of American life. Barry Commoner, the biologist and environmentalist, recently conducted a study of a hundred households in Easthampton, Long Island, in which participants were asked to separate their garbage into four containers: one for food debris and soiled paper (to be made into fertilizer), one for clean paper, one for metal cans and glass bottles, and one for all the rest. Mr. Commoner found that, because it was rationally discarded, a stunning 84 percent of the garbage from these households could be sold or recycled. Only 16 percent had to be deposited in a

landfill. Of course, this experiment lasted only a few weeks, and the households surveyed had actively volunteered to take part. Recognizing that his results were perhaps a little skewed, Mr. Commoner conducted a telephone survey in Buffalo, New York, and ascertained that a reassuring 78 percent of all respondents said sure, they'd be willing to separate their garbage into four containers. However, only 26 percent of the respondents said that they thought their neighbors would be willing to do so. This "What would the neighbors do?" question has a special resonance for Garbage Project researchers. We have found over the years by comparing interview data with actual trash that *the most accurate description of the behavior of any household lies in that household's description of the behavior of a neighboring household*. Americans have a pretty firm understanding of human nature; they just don't want to admit that it applies to themselves.

**T**here have been studies that claimed that the people most likely to recycle are those with the most money and the most education, but all of these studies are based on people's "self-reports." A look

the refuse of any previous society, contains three specific components: a hazardous component, a reusable and recyclable component (the useful component), and a non-hazardous, non-useful component (the "other" component).

In most traditional societies, there is a distinction made between "hazardous trash" and "safe trash." Usually the hazardous trash consists of broken glass and chipped stone fragments, dangerous because they have sharp edges. In our own society, our household hazardous wastes are substantially more complex, including wastes that are

flammable, corrosive, toxic, and reactive. While household hazardous wastes are usually less than one percent of the residential waste stream, the quantities generated can be quite high. Household maintenance items including paints, varnishes, and glues are the largest fraction by weight, with auto items (mostly motor oil) and household batteries also significant proportions. Pesticides, herbicides, and other yard items represent a relatively small but possibly quite dangerous fraction.

Then there's the useful component. We have the potential to recycle consider-

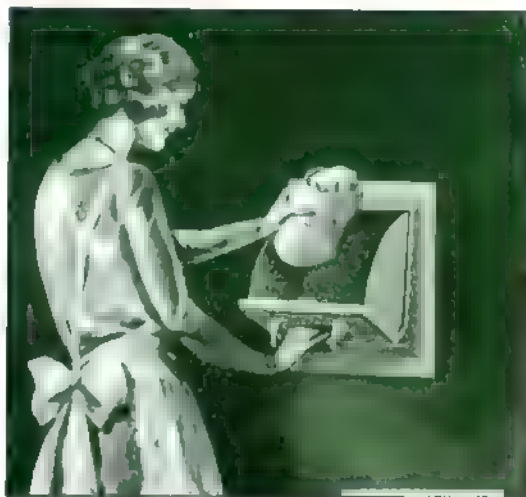
ably more of our modern wastes. Approximately 20 percent of the refuse we analyzed from six census tracts in Phoenix in 1988 was composed of aluminum, newsprint, corrugated cardboard, glass, and PET plastics (the materials perhaps most amenable to recycling given the current state of markets and in-situ recycling technology). An additional 30 percent was composed of other types of recyclable papers, yard wastes, metals, and textiles (rags). (The recyclable fraction does not include recyclable plastics other than PET.)

Even the traditionally non-useful "other" compo-

nents of residential refuse might have characteristics that would make them ideal for incineration, compaction, or storage in landfills. Knowledge of the characteristics of this "other" component is valuable information for landfill managers and planners.

**GARBAGE ISN'T DECAYING OR DEGRADING IN LANDFILLS.** The degradation of refuse components after they are deposited in the landfill is probably quite slow. Thus, wastes are largely relegated to indefinite storage when placed in the typical modern landfill. Greater knowledge on how materials degrade over time and under differ-

through household garbage yields a different picture. Between 1973 and 1980, the Project examined some 9,000 refuse pickups in Tucson from a variety of sample neighborhoods chosen for their socioeconomic characteristics. The contents were carefully sorted for newspapers, aluminum cans, glass bottles, and tinned-steel cans (evidence that a household is not recycling), and for bottle-caps, aluminum pop-tops, and plastic six-pack yokes (possible evidence, in the absence of bottles or cans, that a household is recycling). A lot of statistical adjustments and cross-referencing had to be done, but in the end we made three discoveries. First, nobody recycles as much as they say they do (but they do recycle just about as much as they say their neighbors do). Second, patterns of recycling by household vary over time; recycling is not a consistent habit. Third, high income and education and even a measure of environmental concern did not predict household recycling rates. *The only reliable predictor was the price paid for various commodities at buyback centers.* When prices rose for, say, newsprint, the number of newspapers found in local garbage suddenly declined as service groups and charities found it worth their time to collect and recycle.



**The disappearing garbage trick, 1930**

**E**very Garbage Project study seems to prompt the same conclusion: Our world is composed of two realities, one mental and one material. I personally believe that today's "Garbage Crisis" is largely the result of significant differences between the real world and the mental worlds which revolve around common household refuse. On one side there are still very few quantitative studies that physically measure the constituents of refuse. On the other side are all of the unique experiences each of us has had

and the resulting set of personalized attitudes, beliefs, and ideas stored in our minds about garbage. These two sets of information — material measurements and mental perceptions — are equally "real," and both are constantly summoned by government officials, businessmen, environmentalists, and concerned laymen into evaluations of our solid-waste dilemma.

As an archaeologist, I further believe that an even bigger problem with what our society recognizes as a garbage problem is that human behavior is systematically ignored. Today, garbage is perceived as a kind of primordial ooze, spontaneously generated. The material view usually reports "x" percent of plastic by weight, while the mental view often depicts plastics as materials to be eliminated from refuse because they

ent environmental conditions is critical before managers and legislators can successfully plan for waste management and reduction in the 21st century.

**BEHAVIORAL CHANGE IS AS IMPORTANT AS TECHNOLOGICAL FIXES.** Because refuse is produced by human behavior, not by nature, changes in refuse-discard behavior must precede or operate along with changes in waste-handling and -reduction technology. In one sense this is already happening. Our modern metaphors about trash are changing. Our preoccupation with the ugliness and evil associated with throwaways is perceptibly

shifting toward a new understanding of the both values and hazards associated with our discards.

### **METHODS OF GARBAGE ARCHAEOLOGY**

How do archaeologists study modern refuse? The Garbage Project has two types of data suitable for looking at solid-waste composition and degradation:

**THE FRESH REFUSE DATABASE** encodes composition characteristics recorded from refuse as it was discarded by households, prior to compaction in garbage trucks and deposition in landfills. Within each community

studied, sample census tracts are selected in a judgmental fashion. The census tracts together represent the range of selected demographic characteristics (income, ethnicity, household size) present within the overall community and are internally homogeneous with respect to these characteristics. Samples comprising a household-refuse pickup — all the refuse put out by an individual household on a pickup day for city collection — are collected from each census tract. Each of these is segregated into 16 materials-composition categories by student and professional analysts, and the weight of each category is recorded.

Categories include plastics, paper, and organic.

For the long-term study of composition dynamics, refuse from 13 Tucson census tracts between 1978 and the present were analyzed. In addition, six Phoenix census tracts were analyzed for basic recyclable-materials characteristics in 1988. Last, refuse from Tucson (over 1,500 refuse samples, 1985 through 1988), Phoenix (over 700 samples, 1988), New Orleans (over 1,000 samples, 1986), and Marin County, California (over 1,000 samples, 1986) were examined for traces of hazardous wastes.

In this analysis method, when hazardous wastes such



WHEN SEEN IN PERSPECTIVE, OUR GARBAGE WOES TURN OUT TO BE  
SERIOUS, BUT THEY ARE NOT OUT OF THE ORDINARY. PERHAPS THE  
FIRST THING WE SHOULD DO IS CALM DOWN A LITTLE.

are "unnatural" and "harmful to the environment" (usually in some unspecified way). But neither view identifies the role of specific plastics in our lifestyles or social order. As a bathroom products company, would you rather transport your product in glass containers or in much lighter, unbreakable plastic? As a consumer, would you purchase a glass container for the tiled bathroom or a lighter, safer container that won't shatter and cut? Because of the consistency of business and consumer choices, it is now difficult to find bathroom commodities in glass.

For good, for bad, or for ugly, garbage cannot be successfully understood or managed or legislated separate from the behaviors that produce it.



reduction. To me, the central issue is obtaining accurate, objective, scientific data on each of these issues in all three of their dimensions — material, mental, and behavioral.

Politicians, city officials, municipal and private haulers, the municipal engineering industry, environmental groups, and more all have elegant plans to reduce, collect, recycle, reuse, and dispose of solid wastes by means both efficient and environmentally appropriate. In contrast, the physical reality is a mess of immense proportions and complexity. At present, our knowledge and attitudes are out of sync with both behaviors and material realities. *That is the real garbage crisis.*

### The Future of Crisis

The garbage problem in the United States today is indeed serious, but I believe that the most critical issue is not landfill closings or incinerator emissions, collecting recyclables or mandating source

*Archaeologist and garbologist Bill Rathje, founder and director of The Garbage Project, is a professor in the department of anthropology at the University of Arizona. His widely read articles have appeared in such diverse publications as The Journal of Resource Management and Technology, American Behavioral Scientist, and The Atlantic.*

as pesticides, paints, household batteries, and household cleaners are found, they are classified by type and the wastes are weighed. These three analyses — long-term study, recyclable-materials study, and hazardous-wastes study — form the core of The Garbage Project's monitor of modern refuse. Other analyses are conducted as well, such as a detailed item-by-item analysis of some of the refuse samples.

THE LANDFILL REFUSE DATABASE consists of information that encodes composition characteristics recorded from refuse excavated from landfills located in Tucson, the San Francisco

Bay Area, and Chicago. Refuse was excavated and analyzed between May 1987 and March 1989, and represented materials laid down in a variety of environments in terms of sediment characteristics, climate, and precipitation, and derived from a diverse range of social groups participating in an assortment of consumer and discard behaviors.

Excavation uses mechanized equipment — either trenches made with extended-arm backhoes (maximum depth approximately 30 feet), or wells drilled by bucket augers (approximately 90 feet). Dates are recorded from the ubiquitous newspapers

present in almost every backhoe or auger bucket of residential refuse.

Refuse samples for detailed composition analysis are collected at approximately ten-foot intervals in depth. Analysis of the landfill samples starts with screening the refuse through a 1/2-inch mesh screen. Materials passing through the screen are designated as "fines." The remainder of the refuse (larger than 1/2 inch in diameter) are segregated into 19 materials-composition categories and recorded by weight and volume. As in the fresh-refuse weight analysis, the materials-composition categories include plastics cate-

gories — flexible, foam, and rigid; paper categories — newsprint, packaging paper, non-packaging paper, corrugated cardboard, and magazines; and organic categories — yard wastes, food wastes, and wood. Other analyses are also conducted, including moisture-content analysis, an item-by-item detailed analysis, and sub-sampling of fines and other categories.

*Doug Wilson, a doctoral candidate in anthropology at the University of Arizona, is a member of The Garbage Project team and a specialist in household hazardous waste, solid-waste reduction, and recycling.*

# UPSTAIRS! DOWNSTAIRS! What CRASHES! CRASHES!

## 2,500 YEARS OF GARBAGE



We hear we're in the middle of a garbage crisis. But that's nothing new: Waste disposal has been a problem since bands of hunters quit chasing animals and settled down. That's when the garbage started to pile up. The Industrial Revolution accelerated the problem, as refuse from factories and overcrowded tenements deepened in the streets. Municipal crews have spent much of the 20th century scrambling for ingenious ways to empty the collective trash bin.

Inevitably, the shine has faded from their modern-miracle cures. The cry has gone up, heralding a new garbage crisis.

Athens, Greece, designated a dump site outside the city walls in 500 B.C. In the U.S., mounds of putrefying waste grew steadily as 19th-century cities struggled to get garbage out of the streets. In the 1940s, layering organic waste with dry rubbish in a "sanitary landfill" reduced odors, but didn't stem leaking pollutants. Now, landfills are choking on garbage. In a few years, the landfill used by Athens, Alabama, will run out of space, and join the thousands of others closed in the 1980s.

### RECYCLING

In 1690, a mill near Philadelphia began making paper from wastepaper and rags. By 1897, New York City's rubbish was delivered to a "picking yard," where workers separated five grades of paper, four grades of metal, and three of carpet, twine, rubber, and horsehair. In 1904, large-scale aluminum recycling began in Chicago and Cleveland.

Another 82 years passed before Rhode Island became the nation's first state to issue a mandatory

recycling law for newspapers, glass, plastic (HDPE and PET), aluminum, and tin cans.







## COMPOSTING

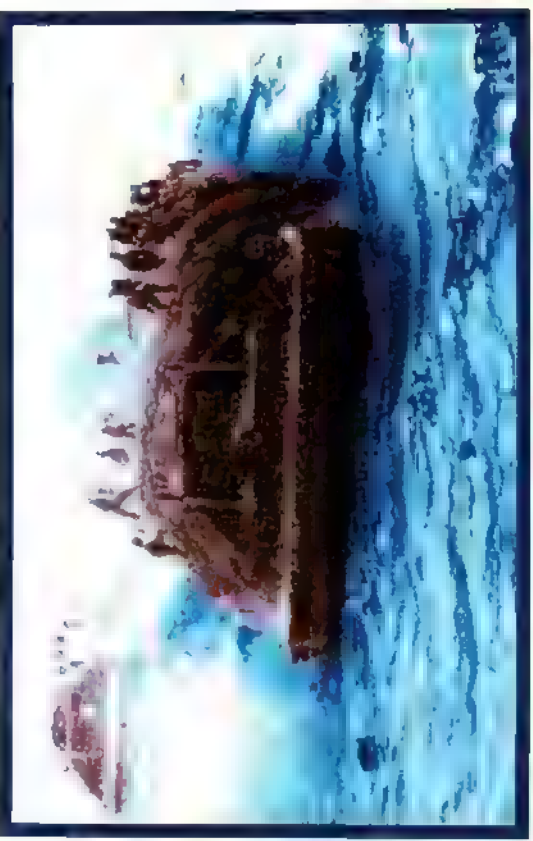
Composting was preceded by colorful attempts to reclaim food waste. A 1925 survey found that 44 percent of American cities used corralled pigs to eat garbage, although trichinosis resulted.

A late-19th-century innovation: In tanks, garbage was steeped, then pressed to squeeze out the oils and fat. These were made into soap, candies, even perfume. Neighboring communities raised a big stink over the noxious fumes, and the plants suffered an odious demise.



## INCINERATION

In 1875, the nation's first incinerator fired up on Governor's Island in New York. By the turn of the century, 300 of them were smoking up North America. In 1906, an impressed observer wrote that the self-sufficient incinerators made more than enough power to light nearby stables. By 1938, design improvements led as many as 700 cities to use incinerators. Now, because of the availability of cheap landfill space and growing concerns over pollution, all but 169 cities have extinguished their garbage burners.



## WANDERING GARBAGE

In 1987, the barge *Mohro 4000* searched for two months and over 6,000 miles for a place to dump its load of Islip, N.Y., garbage. A new crisis? One hundred and one years ago a Washington, D.C., health officer wrote in his garbage report: "Appropriate places for [refuse] are becoming scarcer year by year...The waste must be provided for, and provision should not be longer delayed.

No doubt it *was* delayed. Because the real crisis — then and now — is that even though we're producing more garbage than ever, none of us wants the latest disposal option in our backyard.



# LANDFILLS ARE #1

BY BILL BREEN


**B**urdened with 90 cubic yards of garbage, the truck looks no larger than a Tonka Toy as it clammers up the 135-foot slopes of trash. At the landfill's summit, bulldozers squash and spread assorted detritus across 2,200 acres: mattresses, beer cans, tires, rugs, cleaning solvents. Seagulls swarm like black flies over the aromatic food waste.

These are the hills of New York City's Fresh Kills, the largest municipal garbage dump on the planet. Built on ecologically sensitive salt marshes on Staten Island's edge, the

**D**espite gains in recycling, landfilling is the nation's leading method of solid-waste disposal. Some say that dumps should continue to top the list.







Fresh Kills Landfill is the final resting place for more than two-thirds of New York's trash. Each day, this vast garbagescape absorbs more than 34 million pounds of refuse from the city's households and businesses. At its present growth rate, the Fresh Kills Landfill will evolve into a 505-foot mountain of trash by 2005, when it is expected to reach its capacity (although no one can say when it will *really* close).

In New York City, as well as the rest of the country, landfilling remains by far the predominant form of solid-waste disposal.

(The U. S. Environmental Protection Agency

estimates that 80 percent of the nation's municipal solid waste material is being dumped.) Most environmental groups will concede that until there's sufficient demand for recyclables, landfills will probably continue to be our number one garbage-disposal method, and will always be needed for the discards that can't be recycled and the bottom ash that remains after incineration. Yet Fresh Kills shows us, in a big way, why the town dump remains on every environmentalist's hate list:

**Landfills consume precious municipal space.**

It's silly to suggest that landfill space is vanishing in a country as vast the U.S. Even so, some densely populated areas in the Northeast and Midwest really are running out of places to dump. So why does New York want more garbage for its primary landfill?

The city is planning to cut its dumping fee at the Fresh Kills Landfill from \$40 to \$25 a cubic yard for garbage that's been picked clean of recyclables. A spokesman for the sanitation department justified the move as a way to encourage private haulers to recycle. Critics say that the decreased fee is really meant to bring enough garbage back to Fresh Kills to increase city revenues by \$17 million a year.

**Fresh Kills, NYC, already the world's largest municipal dump, is still growing.**

**"There is no environmental objection to the landfill that I have heard of that cannot, for a cost, be controlled."** — Prof. Iraj Zandi of the University of Pennsylvania.

• **Landfills discourage recycling and waste reduction.**

New Yorkers throw out more garbage (about six pounds per person, per day) and recycle less of it (about six percent) than many other city dwellers. (The national-recycling average is around 13 percent, according to the EPA.) Environmentalists are concerned that Fresh Kills' yawning maw offers a convenient alternative to reducing, reusing, composting, and recycling waste. To critics, landfills foster an irresponsible attitude toward resource consumption.

"One way to prod decision-makers toward recycling is to point out the health and environmental problems associated with landfills like Fresh Kills," says Larry Shapiro, an attorney with the New York Public Interest Research Group.

• **Landfills pollute groundwater and surface water.**

Each day, more than one million gallons of chemically contaminated leachate — runoff laced with such household hazardous wastes as the sulfuric acid in silver polish and the naphthalene in drain cleaners — oozes into underground waterways beneath the high-rise garbage repository at Fresh Kills. The EPA has already indentified over 100 potentially harmful substances in landfill leachate.

Researchers at the University of Southern California suggest that natural anaerobic processes convert even benign waste (such as the lignin in paper) into toxic chemicals like benzene and toluene. Yet only 25 percent of all mu-

nicipal landfills have tested nearby waterways, even though drinking-water wells exist within one mile of 46 percent of the country's landfills. Fortunately, Staten Island residents do not rely on groundwater for their water supply.

• **Landfills emit gases that threaten the atmosphere.**

The Fresh Kills Landfill lacks a comprehensive gas-collection system, so most of the methane, carbon dioxide, and trace levels of carcinogenic-organic chemicals (such as vinyl chloride, toluene, and benzene) produced by its decaying garbage escape directly into the air.

Gas emissions from landfills are a growing concern because methane traps about 25 times more infrared energy than does carbon dioxide, the trace gas most often cited as the leading contributor to the possible heat blanketing of the Earth. Don Augenstein, a chemical engineer who's studied landfill methane, reports that methane emissions from U.S. landfills could contribute as much as two percent to the entire buildup of greenhouse gases. By comparison, landfill-methane emissions, in their greenhouse effect, easily exceed the amount of carbon dioxide expelled by 10 million automobiles.

Further clouding the landfill picture is the EPA's estimate that about 200,000 metric tons of volatile organic chemicals (VOCs) — which can affect atmospheric ozone and smog concentrations — are emitted from Fresh Kills and other U.S. landfills each year. "Fresh Kills has all of the problems of the rural, hole-in-the-ground dump," says Larry Shapiro. "Except now, it's a mountain."

• **Unsanitary, Sanitary Landfills**

Fresh Kills started accepting New York's waste in 1949, when a handful of city officials proposed that the "unsightly and unsanitary wastelands" in Staten Island could be filled with garbage, and eventually transformed into a beltway of parks. Of course, the planned operations at Fresh Kills would in no way resemble the malodorous, smoking, insect- and rat-infested dumps in other parts of the city. Fresh Kills, said the officials, would be a "sanitary" landfill.

Landfilling became the leading form of solid-waste disposal

**Cape May, New Jersey: Workers foam garbage to keep the odors in and sea gulls out.**

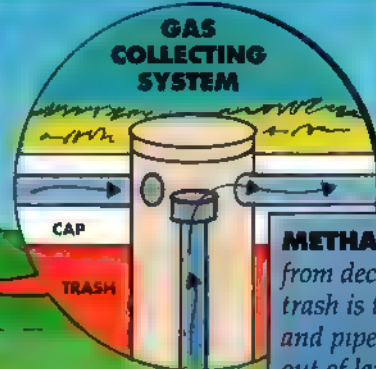
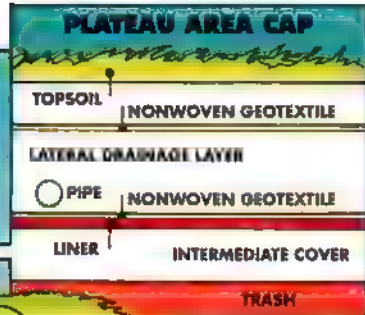
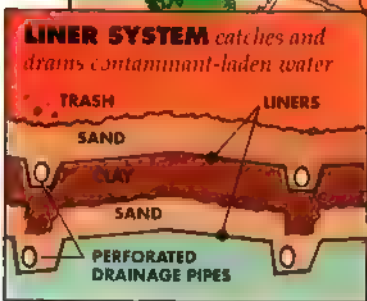


BILL GREEN



# ANATOMY OF A MODEL LANDFILL

No longer a simple heap of trash, today's modern landfill is engineered to seal garbage and pollutants.



**METHANE** from decaying trash is tapped and piped out of landfill.

**ON-SITE WELLS** monitor groundwater.

**THE GARBAGE** is covered daily with synthetic foam or topsoil.

**TRENCH FOR SURFACE RUNOFF**

**LANDFILL** sits on the ground, not in the ground.

## LEACHATE TANKS

store the drained effluents from landfill until removed.

in the 1940s and 1950s, as government bureaucrats discovered inexpensive, undeveloped land on the outskirts of cities. To promote land-filling, proponents used the prefix "sanitary" as a catchword to distinguish the modern dump from open pits. As defined by the American Society of Civil Engineers, sanitary landfilling requires little more than covering the refuse "with a layer of earth at the conclusion of each day's operation." In design and practice, the new dumps were far from sanitary.

By 1971, more than 90 percent of the 14,000 communities using dumps failed to meet even the minimum requirements of the so-called sanitary landfill. "Only new legislation in 1976, an increasing scarcity of urban landfill sites, and growing public sentiment against contamination of the land and water finally placed real pressure on the open-dump system," write Louis Blumberg and Robert Gottlieb in their book, *War On Waste*.

Now, the EPA reports that of the 5,499 landfills currently operating nationwide, 4,265 will close in just 18 years. But closures do not necessarily predict future capacity. Consider Pennsylvania: At the same time that the state was losing 13 municipal landfills (between July 1986 and November 1987), its overall capacity was increasing because one

new landfill had opened and two more were expanding. When you hear talk of declining landfill space, it's important to recognize that the scarcity has as much to do with politics (read "not in my backyard") as it does with escalating mounds of garbage.

Nevertheless, with 80 percent of the country's landfills due to close in the next 20 years, one of the looming challenges for solid-waste engineers will be the proper sealing, salvaging, and monitoring of some of the nation's most contaminated dumps. Of the 1,777 sites included on the National Priorities List — a catalogue of hazardous waste sites eligible for the federal Superfund cleanup program — 207 are old, unlined dumps.

As local governments, with limited federal assistance, shoulder the enormous costs of closing their dumps, siting new landfills will become even more difficult. Recognizing the public's growing intolerance, the EPA ranks landfilling last in its hierarchy of waste-disposal options (after source reduction, reuse and recycling, and incineration). Yet some experts argue that until the country makes significant strides in reducing waste and developing markets for recyclables, landfilling should be ranked at the top of the list.

"There is no environmental objection to

18 OHLSSON

**"There's a tremendous untapped potential for landfills to become ecological oases."** — Anne Gali, director of environmental operations at the Hackensack Meadowlands.

the landfill that I have heard of that cannot, for a cost, be controlled," argues Iraj Zandi, professor of resource management and technology at the University of Pennsylvania. "Landfilling of municipal solid waste can be designed so that all environmentally undesirable effects can be eliminated."

### **The New, Improved Dump**

No responsible solid-waste engineer will tell you that he can build a landfill that will *never* leak or bleed gases. "I wouldn't give anyone a 100-percent guarantee," says Thomas Marturano, a landfill designer and director of the division of solid waste at the Hackensack Meadowlands in New Jersey. "But yes, I can build a safe landfill." In 1982, the residents and politicians of southern New Jersey took Mr. Marturano and other engineers at their word when Cape May County accepted a 70-acre landfill.

Building the Cape May landfill presents special problems. The sandy soil in the county's pine barrens is porous and the water table is only about 11 feet beneath the surface, leaving residents' wells vulnerable to rainwater that could seep through the landfill, leaching out organic chemicals and other compounds. A hole in the ground won't do. Landfilling in Cape May amounts to hill building, starting at ground level.

The Cape May facility must comply with New Jersey's strict environmental rules for landfills, which already exceed the tougher regulations expected in October from the EPA. (Although states set landfill standards,

they will have to meet the minimums issued by the federal agency.) Cape May's Secure Sanitary Landfill Facility represents the updated version of the not-so-sanitary dump.

First, giant earth-moving machines compact and grade the topsoil. Workers then add two synthetic liners of high-density polyethylene, sandwiched between alternating layers of clay and sand. The double-liner system is honeycombed with two levels of HDPE pipes, sloped so the rainwater that percolates through the landfill is drained into a central collection point. The upper network collects the leachate (about two million gallons per year), while the lower level detects and collects any breach in the liner system. The leachate is pumped into two concrete holding tanks and trucked to the county's wastewater-treatment plant for processing.

Some laboratory experiments indicate that volatile organic chemicals (such as toluene and xylene) can eat through synthetic liners. Engineers argue that under real landfill conditions, the chemicals are so diluted that they cannot breach the 60-millimeter liners used at the Cape May landfill. Of greater concern is the seaming of the liner segments. The huge rolls of polyethylene are laid down like carpet, overlapped, and welded with a heat gun. A poor seam, or a rip during installation, is a far more likely way for a liner to fail. "The manufacturer's guarantee on a liner is worthless," says Mr. Marturano. "Everything depends on the installation."

At Cape May, 16- and 18-acre cells of compacted trash are the landfill's basic building blocks. Once a cell absorbs its fill of garbage, its crown is capped with a 40-in HDPE liner, one foot of topsoil, and 18 inches of sand, which keep the garbage in and the rainwater out. To monitor the performance of the leachate-containment system, the landfill's operators have drilled 18 wells down to the aquifers, enabling them to routinely check possible contaminants for up to 30 years after the operation is closed.

### **A Whole Lot of Hot Air**

After leachate containment, the largest technical problem in landfill management is the control of gases. The methane from the Cape May landfill's

**Katy Wiedel, designer, and Russell Walters, contractor, are pioneer restorers of a New Jersey dump.**



BILL GREEN



decaying garbage is simply vented into the atmosphere, making this secure-sanitary facility, well, somewhat less than secure (even though it already complies with the upcoming EPA regulations on gas emissions). Why isn't the dirty methane tapped, cleaned of carbon dioxide and other contaminants, and sold as a low-grade fuel? Right now, the Cape May landfill is too small and too young to make gas collection economically viable, according to Charles Norkis, chief engineer for the Cape May County Municipal Utilities Authority.

Nationwide, about 1500 landfills deal with gas emissions by venting or burning gas as it escapes from collection pipes. The Office of Technology Assessment reports that if landfill methane was collected completely and processed for energy recovery, it could account for up to five percent of all natural-gas consumption or one percent of all energy demand in the U.S. Instead, between three to eight million metric tons of methane escape from the nation's landfills each year.

Owners of about 123 of the country's largest landfills, however, are finding that methane recovery can transform the town dump from a liability to an asset. The Pacific Energy company is collecting methane from 12 landfills in California and Maryland. "There are three ways to get energy out of landfill gas," says Tony Henrich, a spokesman for the Los Angeles-based company. "You can drop out the water and sell it over the fence to a nearby industry, or use it to produce electric power with gas, steam, turbine, or internal combustion. Or, you can remove the carbon dioxide and other trace compounds, and sell the purified gas as pipeline-quality methane. But unless a landfill emits enough methane to produce two megawatts of power, we're not interested. It just doesn't pay out."

### **Picnic at the Hackensack Dump**

Decaying garbage can be recycled as an energy resource, so perhaps we should be thinking of landfills as more than just non-renewable, ever-expanding burial mounds. Some solid-waste engineers suggest that by entombing garbage to cut leachate and gas emissions, we are hindering the landfill from doing what it does best — biologically decompose our solid waste. Writing in *BioCycle* magazine, John Morelli of the New York State Energy Research and Development Authority argues that with enough water, a landfill can be a dynamic, anaerobic composter. Perhaps it's time to take a fresh look at the old dump.

Because dumps can take as long as 90 years to complete their process of decomposition, Mr. Morelli reasons that instead of trying to cut leachate by eliminating the moisture

content in landfills, we should *add* water or even recirculate leachate through the landfill to speed degradation. In an interview, he estimated that leachate recirculation can degrade 90 percent of a landfill's organic wastes, enabling portions of the dump to be reused within 10 years. Reclamation projects already underway in Florida, Connecticut, Delaware, Massachusetts, and New York are refuting the long-held belief that garbage is supposed to remain buried forever.

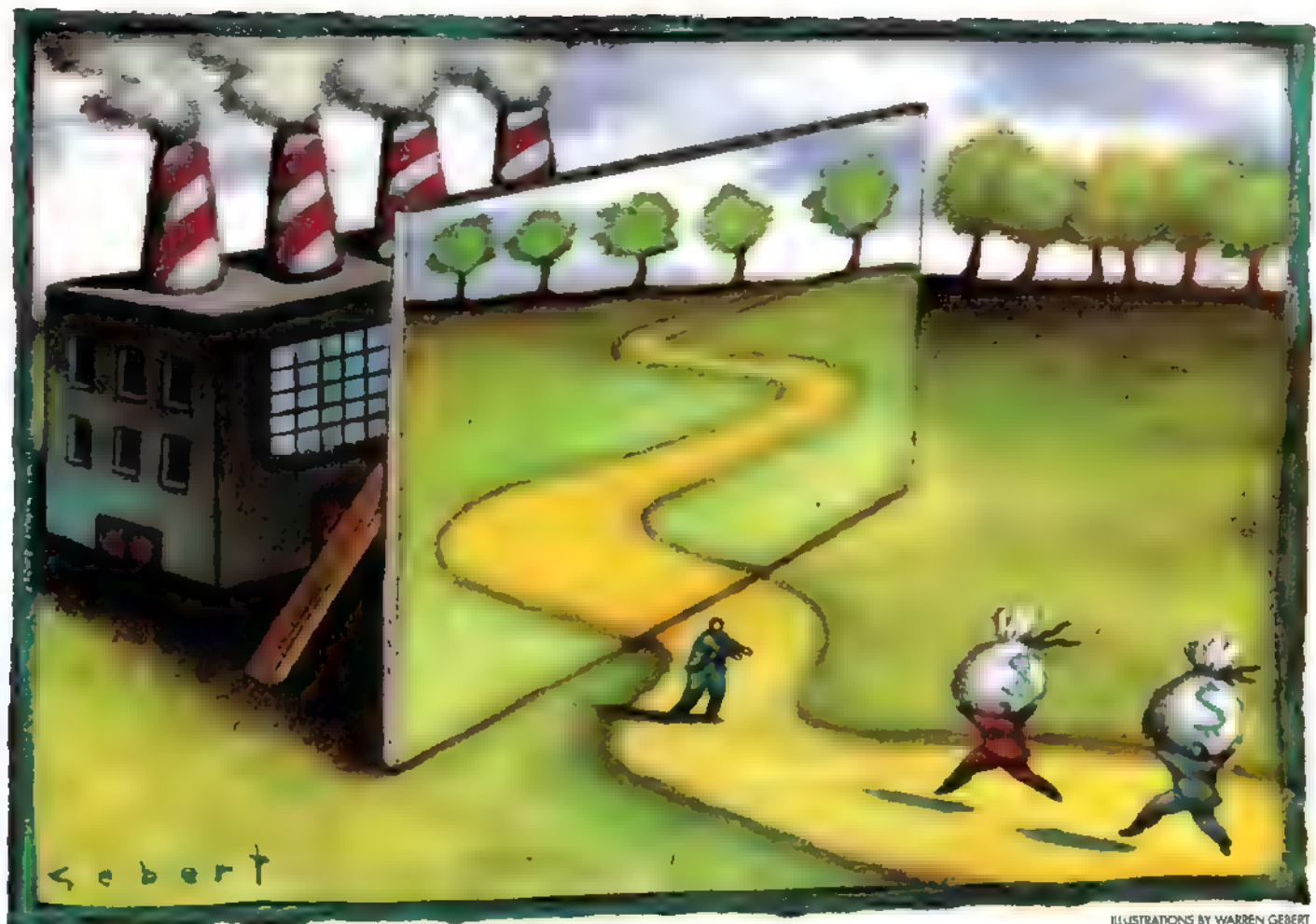
Yet in most of the country's landfills, garbage is forever. Sometimes, municipalities convert their retired dumps into golf courses or amusement parks. Most of the time, when a dump is filled to capacity, it's simply abandoned. Never has a landfill site been returned to something resembling its natural state before it was buried under tons of trash; never, that is, until workers began restoring a landfill in New Jersey's Hackensack Meadowlands.

Here, landscapers are transforming six acres of a closed landfill into grass meadows and young woodlands. This "Experimental Park on a Landfill" is intended to test the adaptability of various plant species to the thin layer of unirrigated, unfertilized soil and the dry, windy conditions typical of a landfill; and provide food and shelter for the likes of songbirds and rabbits, mice and raccoons.

The six acres, containing 215,000 cubic yards of garbage, was capped with a synthetic membrane made with 440,000 recycled, PET-soda bottles that may otherwise have been buried. The one-liter bottles were processed into a fibrous material that looks and feels like a golf putting green, and bonded to a Hypalon liner. The mesh formed from the bottles prevents both the liner and nearly 15,000 cubic yards of topsoil from sliding off the landfill's steep slopes.

In a few years, groves of green ash and red cedar will canopy the landfill's crown. Now, a meandering footpath is edged with gray dogwood and fragrant sumac. The landfill offers sweeping views of the sky and surrounding waterways which are all too rare in this densely populated corner of New Jersey.

Eventually, the experimental park may point the rest of the country toward salvaging the thousands of acres of meadowlands and wetlands that shortsighted sanitation officials once dismissed as unsightly, unsanitary, and ultimately unusable — except for garbage dumping. "There's a tremendous untapped potential for landfills to become ecological oases," says Anne Galli, director of environmental operations at the Hackensack Meadowlands. "But we've got to assist the natural regenerative processes at landfills, not stand in their way."



ILLUSTRATIONS BY WARREN GEBERT

# ENVIRONMENTAL INVESTING

**R**UTH DYKE IS A DEDICATED ENVIRONMENTALIST. The Auburn, California, grandmother recycles, searches out green goods like stationery made from recycled paper, and encourages her family to take practical measures to help conserve our natural resources.

**SOMETIMES,**

**POLLUTERS PROFIT**

**FROM GREEN**

**INVESTMENTS**

BY RONIT ADDIS ROSE



# "WE ARE ENVIRONMENTALISTS."

FLETCHER THORNE-THOMPSEN JR. OF BROWNING-FERRIS  
INDUSTRIES. LISTED IN SEVERAL ENVIRONMENTAL PORTFOLIOS,  
THE FIRM HAS BEEN SLAPPED WITH \$3 MILLION  
IN FINES SINCE 1980.

Yet Ms. Dyke, 50, felt that her environmentally correct lifestyle wasn't enough. She had heard about socially responsible investing, where investors do good with their dollars by supporting industries that are in step with their personal ethics. So she decided to look for an environmentally responsible place to make her money grow.

Her broker introduced her to the Freedom Environmental Fund, a mutual fund launched in October 1989. She obtained Freedom's prospectus, a legal document describing its services and fees, which all funds file annually with the Securities and Exchange Commission. Opening with a photograph of Niagara Falls, it noted repeatedly that Freedom would invest in companies that "contribute to a cleaner and healthier environment." Lured by the opportunity to make, in a brochure's words, "a positive contribution toward cleaning up the Earth's endangered environment," she mailed in a \$15,000 check.

Six months later, after receiving its semi-annual list of investments, Ms. Dyke discovered that Freedom was using its assets, including her \$15,000, to back companies that improperly dumped hazardous waste, violated federal air emission standards, and discharged pollutants into waste-treatment systems. Appalled by the realization that her earnings were contributing to polluters' profits, she quickly closed her account and fired a letter of complaint to the SEC.

Ruth Dyke's experience illustrates a growing problem in the world of environmental investing: While some mutual funds maintain strict guidelines for weighing environmental responsibility, other so-called "environmental" funds don't even consider the pollution records of the companies in which they invest. Unwary investors, believing they are putting their money to work and upholding their environmental standards, are inadvertently backing some of the nation's worst polluters.

With different types of funds being described by the same catchwords, it's

no wonder that an inexperienced investor such as Ruth Dyke would get confused. Even among the investment and environmental communities, there is little agreement as to what constitutes environmental responsibility, and there are no agreed-upon standards for evaluating a corporation. No one, including regulatory authorities, defines the term "environmental," although the SEC does regard environmental funds as a separate category, and checks their filings carefully.

"Any new class of funds gets extra scrutiny to be sure that they're doing things right," says Mary McCue, an SEC spokeswoman. How does the SEC decide which funds go into an "environmental" class, given the variety of funds using the term? "Oh, I think we're smart enough to figure that out," she replies. So you see, the word "environmental" on a mutual-fund document sometimes means about as much as the word "lite" on a carton of ice cream.



## Clean Investments, Dirty Companies

While the "environmental" tag is becoming a popular selling tool for mutual funds, social investing is not a new concept. It kicked off in the early part of the century, when religious groups like the Methodists, the Presbyterians, and the Baptists shunned companies that promoted activities they considered sinful, such as

smoking, drinking, and gambling.

During the 1970s, shareholders became increasingly active in persuading institutions to divest from companies that continued to operate in South Africa. In the early 1980s, socially responsible mutual funds such as Calvert and Parnassus sprang up, touting themselves as actively avoiding companies with South African holdings.

Just as apartheid inspired a vivid chapter in the history of social investing, growing public concern over the degradation of the environment has sparked a similar movement today. As the public becomes more aware of such problems as global warming, depletion of the ozone layer, toxic wastes, and air and water pollution, increasing attention is being paid to companies' environmental behavior. Catastrophes like the Valdez oil spill heighten environmental awareness even more.

While many of the socially responsible funds have long had an environmental criterion, until quite recently it was rare to find one dedicated exclusively to the environment. Today, there are roughly 14 funds with some type of environmental component. About eight focus almost exclusively on the environment. The whole group can be divided into three categories:

- Funds that invest in environmental service companies involved in hazardous-waste disposal, solid-waste handling, recycling, and waste-water management, but do not screen to determine their impact on the air, land, and water. Some of the companies are clean. Some may be dirty. And some funds invest in them, despite claims that they only back companies that promote a "healthy environment."

- Funds that screen investments to ensure that the companies are environmentally responsible. Companies engaged in recycling, alternative energy, cogeneration, pollution control, water management, and sometimes waste-to-energy are found in these portfolios.

- Socially responsible funds, such as those that avoid companies that produce or market alcohol or tobacco, or

that have South African holdings or low minority representation. Many of these funds also use a company's environmental record as one more litmus test to determine whether it's a socially responsible investment.

Most of the funds managed by large groups — Kemper, Fidelity, Freedom, and Oppenheimer — invest in companies that the portfolio manager believes have good prospects to make money, regardless of their pollution record. Their portfolios include companies like Waste Management, Inc.

and Browning-Ferris Industries, Inc. The nation's two largest waste haulers, both firms have committed numerous regulatory and criminal violations.

Waste Management has paid fines and settlements of some \$18.5 million for environmental violations since 1980, and \$5 million in criminal fines, primarily for anti-trust violations, over the past 20 years. Browning-Ferris' record is not much better: \$3 million in environmental fines and settlements over the past decade, and roughly \$15.5 million in criminal fines, civil

penalties, and settlements for transgressions such as price fixing and illegal discharge of hazardous waste.

Freedom Environmental's portfolio manager, David Beckwith, sharply disagrees that Waste Management's run-ins with the Environmental Protection Agency make it a poor candidate for an investment. He maintains that in spite of its problems, the company contributes "to a cleaner and healthier environment," as Freedom Environmental promises all its investments will do.

## Environmental Portfolios

Tracking the Winners, Losers, and Also-Rans of Environmental Investing

Fund (inception date)	Lead Manager (tenure)	Min. Invest. (subsequent)	Front-end Load	Net Assets in millions	Expense Ratio	Return* 1/90-6/90	Return* 8/87-6/90
<b>SOCIALLY RESPONSIBLE FUNDS; SCREEN POLLUTERS</b>							
Calvert Social Investment – Managed Growth (1982) 800-368-2748	Dominick Colasacco (inception)	<b>\$1000 (\$250)</b>	<b>4.5%+</b>	<b>\$215</b>	<b>1.30%</b>	<b>1.04%</b>	<b>16.59%</b>
Calvert Social Investment – Equity (9/87) 800-368-2748	Dominick Colasacco (inception)	<b>\$1000 (\$250)</b>	<b>4.5%</b>	<b>\$22</b>	<b>0.50%</b>	<b>1.72%</b>	long-term results n/a
Dreyfus Third Century (1972) 800-782-6620	Tom Frank (8 months; interim mgr.)	<b>\$2500 (\$100)</b>	No load	<b>\$189</b>	<b>1.05%</b> (5/31/90)	<b>20.57%</b>	<b>26.80%</b>
Parnassus (1985) 800-999-3505	Jerome Dodson (inception)	<b>\$2000 (\$500)</b>	<b>3.5%</b>	<b>\$26</b>	<b>1.65%</b> (12/31/89)	<b>3.15%</b>	<b>-3.10%</b>
Pax World (1971) 800-767-1PAX	Anthony Brown (inception)	<b>\$250 (\$50)</b>	No load+	<b>\$108</b>	<b>1.10%</b> (12/31/89)	<b>6.01%</b>	<b>24.98%</b>
Working Assets (1983) 800-533-FUND	Frank Tsai (four years)	<b>\$1000 (\$100)</b>	No load+	<b>\$215</b>	<b>1.13%</b>	<b>3.06%</b>	<b>20.10%</b>

**Footnotes:** + – 12b-1 fee (see below), ♦ – estimated, ◇ – annualized, ☆ – from inception, ★ – 1% redemption fee (back-end load), ⊙ – some socially responsible investments, \* – sources: Lipper Analytical Services, Inc.; Merrill Lynch; **GARBAGE** staff.

All information as of 6/29/90 except where noted. Table compiled by Mark Fosshage.

**AVERAGE PERFORMANCE  
OF ALL-EQUITY FUNDS:**

**2.94%      14.21%**

### The Terminology of Investing

**Front-end load:** The sales charge, or percentage of your investment, that usually goes to pay the broker who sells you the fund. Most funds decrease the load for large investments.

**Assets:** The total amount of money invested in the fund.

**Expense Ratio:** The percentage of assets that pays fund expenses, such as management fees, commissions, and administration.

**12b-1 fee:** A percentage of assets (up to 1.25 percent) the fund is permitted to take annually to pay for marketing expenses.



"Waste Management is in the environmental-cleanup industry. By definition it's going to have a record in the same way that a hockey player is going to get penalties. It's part of the business," says Mr. Beckwith. "The fact is they handle solid waste better than anyone." He points out that the company, through its 500-odd subsidiaries, is the largest collector of recyclable materials in the country. It operates nearly 40 centers that recover materials such as aluminum, paper, glass, and plastic.

Browning-Ferris is another major

player in recycling and other pollution-control businesses like asbestos abatement and resource recovery. Fletcher Thorne-Thomsen Jr., vice president of investor relations at Browning-Ferris, asserts that his firm treats every violation seriously. "We are environmentalists," he says. "I don't think the funds have looked beyond simply what they've read in the newspaper. They haven't bothered to talk to us and to try to understand the company better."

Despite both firms' recycling ef-

forts, many socially responsible investors scoff at the notion that Waste Management and Browning-Ferris can be viewed as "clean" companies. They point to other environmental service companies with better records, such as Wellman, a fiber company and the nation's largest plastics recycler, Safety Kleen, All-Waste, and Calgon Carbon.

Still, these companies are all much smaller than Waste Management and Browning-Ferris, at \$4.5 billion and \$2.6 billion in revenues respectively, and none covers the same spectrum of

Fund (inception date)	Lead Manager (tenure)	Min. Invest. (subsequent)	Front-end Load	Net Assets in millions	Expense Ratio	Return* 1/90-6/90	Return* 8/87-6/90
<b>ENVIRONMENTAL FUNDS: SCREEN POLLUTERS</b>							
Merrill Lynch Eco-logical Trust <b>Q</b> (4/90) 609-282-8724	stocks picked by a committee of 4 firms	<b>\$1000</b> <b>(\$10)</b>	<b>4.0%</b>	<b>\$7</b>	<b>1.60%♦♦</b>	<b>23.41%♦</b>	long-term results n/a
New Alternatives (1982) 516-466-0808	David Schoenwald (inception)	<b>\$2650</b> <b>(\$500)</b>	<b>6.0%</b>	<b>\$16</b>	<b>1.12%♦</b>	<b>2.27%</b>	<b>26.81%</b>
Schield Progressive Environmental (2/90) 800-826-8154	Glenn Cutler (inception)	<b>\$1000</b> <b>(\$100)</b>	<b>4.5%♦</b>	<b>\$2</b>	<b>2.50%♦♦</b>	<b>31.20%</b>	long-term results n/a
<b>ENVIRONMENTAL FUNDS: DO NOT SCREEN POLLUTERS</b>							
Fidelity Select Environmental Services (6/89) 800-544-6666	Larry Greenberg (inception)	<b>\$1000</b> <b>(\$250)</b>	<b>2.0%★</b>	<b>\$126</b>	<b>2.25%♦</b>	<b>8.20%</b>	long-term results n/a
Freedom Environmental (10/89) 800-225-6258	Ned Weld David Beckwith (inception)	<b>\$1000</b> <b>(\$100)</b>	<b>4.5%♦</b>	<b>\$62</b>	<b>1.76%♦☆</b> (5/31/90)	<b>3.58%</b>	long-term results n/a
Kemper Environmental (4/90) 800-621-1048	Frank Korth (inception)	<b>\$1000</b> <b>(\$100)</b>	<b>5.75%♦</b>	<b>\$69</b>	<b>1.50%+</b>	<b>0.00%</b>	long-term results n/a
Oppenheimer Global Environmental (3/90) 800-525-7048	Don McKerchar Ken Oberman (inception)	<b>\$1000</b> <b>(\$25)</b>	<b>4.75%♦♦</b>	<b>\$34</b>	<b>1.50%+</b>	<b>10.76%</b>	long-term results n/a
SFT Environmental Awareness (11/88) 800-523-2044	Andy Groshans (inception)	<b>\$1000</b> <b>(\$100)</b>	<b>5.0%</b>	<b>\$3</b>	<b>1.12%</b>	<b>10.12%</b>	long-term results n/a

businesses. Environmental performance aside, both companies have been good investments: So far in 1990, Waste Management's stock rose 26 percent, while Browning-Ferris' went up over 25 percent. Wellman, the plastics recycler, saw its stock drop 30 percent during the same period.

### The Green Screen

Only two funds, New Alternatives and the Schield Progressive Environmental Fund, screen polluters. New Alternatives, created in 1982, searches out companies involved in cogeneration, recycling, solar energy, and waste-to-energy incinerators (a technology abhorred by many environmentalists). It also steers clear of investments in atomic warfare, Star Wars, and South Africa.

The Schield Progressive Environmental Fund's investments are screened for environmental responsibility by Progressive Asset Management, an Oakland, California, brokerage firm specializing in ethical investing. (Peter Camejo, president of PAM, is the broker who introduced Ruth Dyke to Freedom Environmental Fund; he has since directed her to Schield Progressive instead.) PAM researches companies primarily through secondary sources: It reads press clips, checks with community groups, looks up violations in EPA reports, and conducts a computer search for litigation involving a particular firm.

Schild Progressive has performed well, showing a 30-percent return since its inception in February, which vaulted it into first place among small mutual funds for the second quarter of 1990, according to Lipper Analytical Services, a mutual-fund-tracking company.

Some of the companies that are consistently recommended by firms that track corporate environmental responsibility include: Wellman, the plastics recycler and fiber manufacturer; Safety Kleen, a motor oil and dry-cleaning solvents recycler; Allwaste, one of the nation's largest



glass recyclers; and Calgon Carbon, a producer of activated carbon, used for filtering drinking water and treating wastewater.

Even these clean companies have positive but imperfect environmental records. All four report minor environmental transgressions. In May, Safety Kleen paid a negotiated settlement of \$405,000 to the California Department of Health Services for alleged paperwork violations dating back to 1984. Allwaste, founded in 1978, was threatened with lawsuits recently when it accidentally released fumes into the air while cleaning a chemical-tank trailer in Texas. Wellman has a pre-merger case against its predecessor for groundwater contamination in Johnsonville, S.C., which is being handled by the company's previous owners. Calgon Carbon notes that it has paid fines only for "minor paperwork errors."

Yet all of these companies have passed the litmus test for environmental responsibility. If problems and fines are a consequence of size, then it's significant to note that all four companies together add up to \$1.3 billion in 1989 revenues, just half of Browning-Ferris' revenues, and well under one-third of Waste Management's revenues for the same year.

Sometimes, one fund's environmental reject is another fund's environmentally responsible corporate citizen. Take Procter & Gamble. P&G, supplier of nearly half of the \$3.5 billion worth of disposable diapers sold annually, could contribute as much as one percent to

the solid wastestream through that product alone. P&G stock can be found in the Pax World Fund. Its prospectus promises PAX "will endeavor to invest in companies which administer ... pollution-control policies." P&G passes Pax' pollution screen, in spite of the disposal-diaper issue.

However, the consumer products giant was rejected from the Merrill Lynch Eco-Logical Trust, even though the company appears to be making an earnest effort to clean up its act by reducing packaging and test marketing highly concentrated detergents.

## THE INS AND OUTS

A mutual fund is a pool of money contributed by lots of people and invested professionally in the marketplace. Joining your money with other people's gives you several advantages. First, your money will get professional management, a service that's too costly for most people. Second, an average investor might only be capable of buying a couple of stocks on his own. Through an equity mutual fund, your investment will be far more diversified.

You can buy a mutual fund through a broker, or directly from the group that manages the fund. A broker is allowed to charge a front-end load (commission) of up



# HOW DOES THE SEC DECIDE WHICH FUNDS GO INTO AN "ENVIRONMENTAL" CLASS, GIVEN THE VARIETY OF FUNDS USING THE TERM? "OH, I THINK WE'RE SMART ENOUGH TO FIGURE THAT OUT." MARY MCCUE, AN SEC SPOKESWOMAN.

Merrill's investments are screened by four separate organizations, including Peter Camejo's Progressive Asset Management. Mr. Camejo concedes that P&G was a difficult call. "There are gray areas," he says. "I will accept that."

Another gray area: If a fund avoids a company on environmental grounds, should it also avoid its suppliers and customers? "If you say, 'I'm opposed to smoking, therefore I'm not going to buy a tobacco company'; then what about an ad agency that writes tobacco advertising?" muses Sheldon Jacobs, editor of *The No-Load Fund Investor*, a mutual-fund newsletter. "Do we eliminate that, too?"

The lack of consensus on what's acceptable as an environmental investment extends to other areas. Ritchie Lowry, president of Good Money Publications, rejects U.S. treasury securities as acceptable investments for environmental funds because public money goes to the military. "The biggest polluter in the world, and one of the biggest users of nonrenewable energy, is the U.S. defense establish-

ment," says Mr. Lowry. "There's a very close connection between the environment and the military, and it's something that a lot of the new funds haven't even seen."

It's not just the new funds that fail to track the military's impact on the environment. Even the environmentally correct New Alternatives Fund had nearly ten percent of its assets in treasury bills as of December 31. "We can't find enough socially concerned banks, so we buy treasury bills," says David Schoenwald, co-portfolio manager of New Alternatives. "We have to park the money somewhere."

## The Bottom Line on Your Environmental Investments

There are no absolutes in environmental investing. "Clean" companies appear in unscreened portfolios because they're good investments; environmentally questionable companies appear in

screened portfolios because no one has yet devised a system to plug all the loopholes.

From a performance standpoint, eight of the 14 funds covered here surpassed the average return for all equity mutual funds during the first half of the year. While a screened fund, Schield Progressive Environmental, led all small funds during the second quarter returns, that fund started up only in February, and has no long-term record by which to judge it. It's also very small, with less than \$2 million in assets, and is not yet fully invested in the market.

Schield Progressive typifies the major problem with the environmental sector. Only half the funds have records dating back to August 20, 1987, the apex of the last market cycle. Because most of the funds have such short-term records, it's impossible to predict performance over the long run.

Does the screening process enhance the fund's performance? "I don't think there's any evidence one way or the other," says Michael Lipper of Lipper Analytical Services. His suggestion for investors who are considering environmental funds: "I think they should wait till there's a record, particularly a record that includes some down periods."

If you want to invest now, look for the best-performing fund that has a low sales charge, or no charge at all. To ensure that your investments are environmentally responsible, scrutinize the fund's portfolio to determine whether the securities listed meet your own environmental criteria. If you're unwilling to risk any return for the sake of your principles, there is one last option. Make as much money as you possibly can elsewhere, and write out a fat, tax-deductible check to your favorite cause by December 31.

Ronit Addis Rose is a senior editor at *Success*, a magazine for entrepreneurs. A resident of Brooklyn, N.Y., her writing has also appeared in *Forbes*.

## OF MUTUAL FUNDS

to 8.5 percent of your total assets. No-load funds (no sales charge) are sold directly to the public by the fund group that offers them. There may be some justification for an investor to pay a low load, if a certain fund is particularly attractive, but it is rarely worth paying the maximum load. While 8.5 percent may not sound staggering, it is significant. It means that out of a \$1,000 investment, only \$915 goes to work for you.

The fees don't always end after you enter a fund. Other charges you could incur include a back-end load, where the fund keeps a percentage of your assets when you withdraw money; and a 12b-1 fee, where up to

1.25 percent of your assets go to advertising costs. You should also compare expense ratios carefully before buying a fund. Two funds that perform similarly could have drastically different results if one of them is significantly more expensive than the other.

There are two common measures of fund performance — yield and total return. Yield reflects how much income the fund produced during the period. It doesn't take into account how the principal changed. Total return measures performance after all capital gains and losses. That's the best number to use when you compare the performance of different funds.

— Ronit Addis Rose

# PANICKED ABOUT PESTICIDE RESIDUES? SOME FOOD POISONS COME COURTESY OF MOTHER NATURE.



## Noxious

IN THE POPULAR MEDIA, FOOD CONTAMINATION often comes back to apples and apple juice. Apples, the all-American preference for so many kids (or at least their Mom's preference), and the source of so much controversy during the infamous "Alar scare."

Last spring, Meryl Streep and other well-meaning mothers championed the cause of pure, untainted food for their children. They assumed that apple juice that was "natural" and "organic" was free of nasty Alar, never realizing that it could be contaminated by a naturally occurring carcinogen called patulin. This fungally derived poison, known as a mycotoxin, is poisonous to animals.

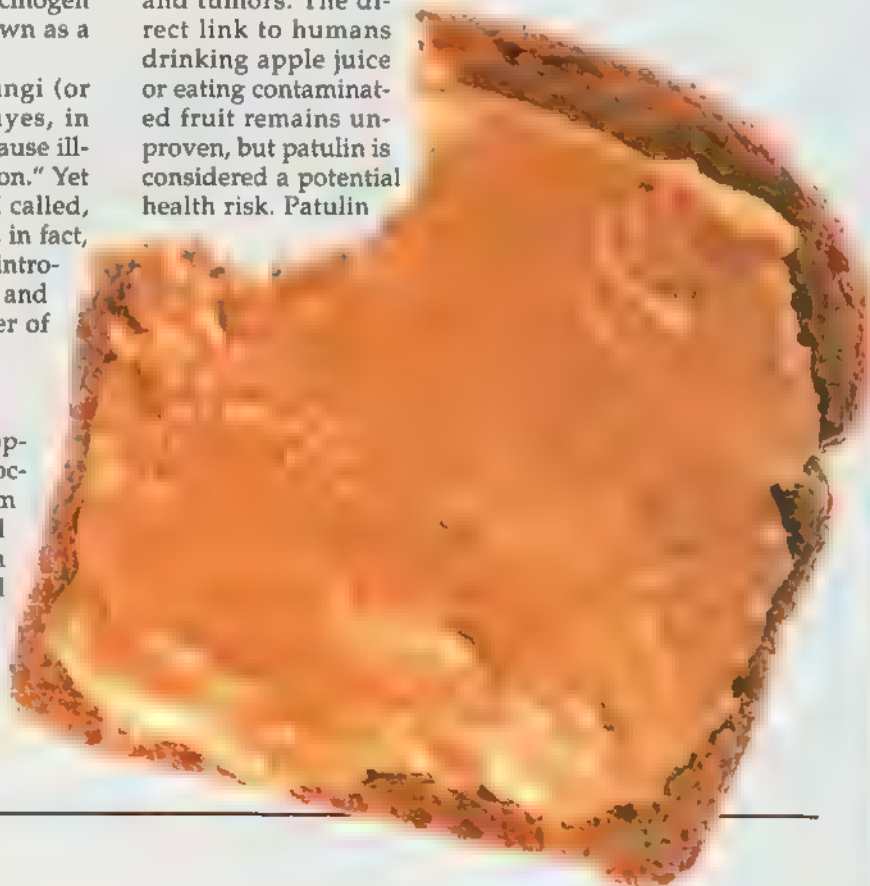
Mycotoxins are produced by filamentous fungi (or molds), which in the words of A. Wallace Hayes, in *Mycotoxin Teratogenicity and Mutagenicity*, "... can cause illness or death on ingestion, skin contact, or inhalation." Yet of the "natural" apple-juice manufacturers that I called, few have ever tested their apples for patulin. And, in fact, uninformed organic gardeners may be innocently introducing several other types of natural, highly toxic, and suspected-carcinogenic mycotoxins into a number of foods that they grow, not just apples.

### What is Patulin?

**P**enicillin is famous for its health-giving properties. It was first isolated from a naturally occurring mold. There are many species of penicillium molds, and two of them, *Penicillium expansum* and *Penicillium urticae*, produce patulin. This mycotoxin has an LD 50 rating\* of 110-118 mg/kg with rats and an oral LD50 of 17 mg/kg with mice. According to Ron Ames, technical manager of the Uniroyal Chemical Company, the licensed manufacturer of Alar, the oral LD50 in test rats for Alar is 6810 mg/kg. By comparison, an oral dose of patulin is

57 to 400 times more toxic than the more infamous Alar, depending on whether you're comparing rats or mice.

Older scientific literature, such as *Mycotoxins in Human and Animal Health*, edited by Joseph Rodricks, Clifford Hesseltine, and Myron Mehlman, commonly listed patulin as non-carcinogenic when ingested by laboratory rats and mice. More current literature, including *Trichothecenes and Other Mycotoxins*, edited by John Lacey, considers patulin to be carcinogenic. Studies on rats, by ingestion and intravenous injection, showed patulin to cause liver damage and tumors. The direct link to humans drinking apple juice or eating contaminated fruit remains unproven, but patulin is considered a potential health risk. Patulin







# NATURALS

can occur naturally in home-grown, treated-as-organic apples. Yet it's fairly easy for gardeners to protect themselves from this potent carcinogen (*see below*).

## What is Aflatoxin?

**H**ave you ever pulled back the husks on an ear of corn to find a greenish-yellow mold growing along the tracks of a corn earworm's herbivorous path? If so, you may have exposed your family to another naturally produced poison, aflatoxin. In tests on laboratory animals, it's one million times more toxic than some of the chemical solvents found in contaminated aquifers, according to Bruce Ames, former chairman of the Department of Biochemistry at the University of California at Berkeley.

Aflatoxin is a very potent mycotoxin of the naturally occurring molds *Aspergillus flavus* and *Aspergillus parasiticus*. Human exposure to aflatoxin is often associated simply with moldy cereal grains, nutmeats, and legumes — although many other types of fruits and vegetables can be infected with this opportunistic fungi. The progressive symptoms of aflatoxin poisoning are not a pretty picture: "Consumption of badly molded cereals ... first causes a discomfort of the mouth, throat, and stomach, followed by inflammation of the intestinal mucosa [and] vomiting and diarrhea," write John Smith and Maurice Moss in their book, *Mycotoxins: Formation, Analysis and Significance*. "As more toxin is consumed, damage to the bone marrow and

hematopoietic system (responsible for producing blood cells) occurs, followed by anaemia and a drop in [white blood] cell counts. Many deaths occur from ... secondary infections but continued ingestion of the toxic food would, inevitably, lead to death anyway."

Aflatoxin is considered a potent carcinogenic compound in animals and man. Exactly how potent is a matter of debate. The February 23, 1989, issue of *The Wall Street Journal* rated aflatoxin as 100 times more likely to cause cancer than the infamous compound PCB (polychlorinated biphenyl). In the cover story of the March 27, 1989, issue of *Newsweek*, entitled "How Safe is Your Food?," aflatoxin was ranked second only to the dioxin-related poison TCDD.

Aflatoxin B1, the most toxic of a family of closely related substances, has been shown to cause liver cancer in laboratory tests with rats, ducks, rainbow trout, salmon, guppies, mice, hamsters, ferrets, and rhesus monkeys. Yet dogs, sheep, and guinea pigs appear to be resistant to the toxin. Most scientists agree that ingestion of aflatoxin-contaminated food can cause an increase in liver cancer in humans. According to the World Health Organization, an intergovernmental agency of the United Nations, aflatoxin contaminated food is suspected of causing cancer of the kidney, colon, and other parts of the human body.

Many of the human population-based studies on aflatoxin contamination have been done overseas, primarily in such Third World regions as Thailand, the Philippines, and East Africa. They show a general correlation between a diet high in contaminated grains and nuts and a higher incidence of liver cancer. However, the literature on aflatoxin is cautious about drawing conclusions. John Smith and Maurice Moss state: "Convincing though the epidemiological evidence is ... the correlation between the two phenomena does not itself prove a causal relationship between them."

\*LD50 stands for the Lethal Dose for fifty percent of the test population. The LD50 is measured in milligrams of the poison per kilograms of the test animal's body weight. The rating of toxicity by LD50 is somewhat controversial because it has not been clearly established whether humans react to each poison in the same way that test animals do. Until a chemical or poison has been used, or misused, long enough to allow for lengthy and costly epidemiological studies, most scientists accept the known variables of an LD50 rating and use it as a relative index of toxicity.

BY ROBERT KOURIK

# WHILE MUCH OF THE LITERATURE ON AFLATOXIN AND PATULIN LOOKS PRETTY SCARY, THE REAL IMPACT IN THE AMERICAN MARKETPLACE IS LESS THREATENING.

## Hazardous Corn

One of the biggest regulatory concerns is the contamination of cattle feed, especially corn, by aflatoxin. In a five-month investigative study published on February 23, 1989, *The Wall Street Journal* concluded: "Many farmers and grain elevators are trafficking freely in untested corn. Others who make an effort to test for aflatoxin use procedures so flawed or sloppy that contaminated corn slips into commercial channels anyway."

WSJ reporter Scott Kilman cites various studies showing that 20 to 36 percent of the corn sampled in grain elevators exceeded the government's standards of 20 parts per billion for aflatoxin. Mr. Kilman reports that "no deaths or cases of cancer have been traced to aflatoxin." He also quotes Rodney Leonard, the executive director of Community Nutrition Institute in Washington, D.C., as fearing that: "There's no way to escape it, 10 to 20 years from now, there will be more cancer because of this."

Despite a general lack of testing for feed corn, last April an Iowan farmer was found to have a 13,000-bushel pile of corn with "the highest level of aflatoxin that's ever been found in the country and perhaps the world," according to Dale Cochran, secretary of Iowa's Department of Agriculture. The 10-foot

high by 70-foot long heap of moldy corn was classified as hazardous waste. Its safe disposal was estimated to cost \$1.5 million. The good news is this particular pile of toxic feed was discovered before entering the human food supply. The system of inspection and detection, in spite of conflicting actions by governmental agencies, was partially working. The bad news is the corn was sold originally at a discount to the Iowan farmer by the Farmers Home Administration, who seized the festering feed from a bankrupt farm in Oklahoma.

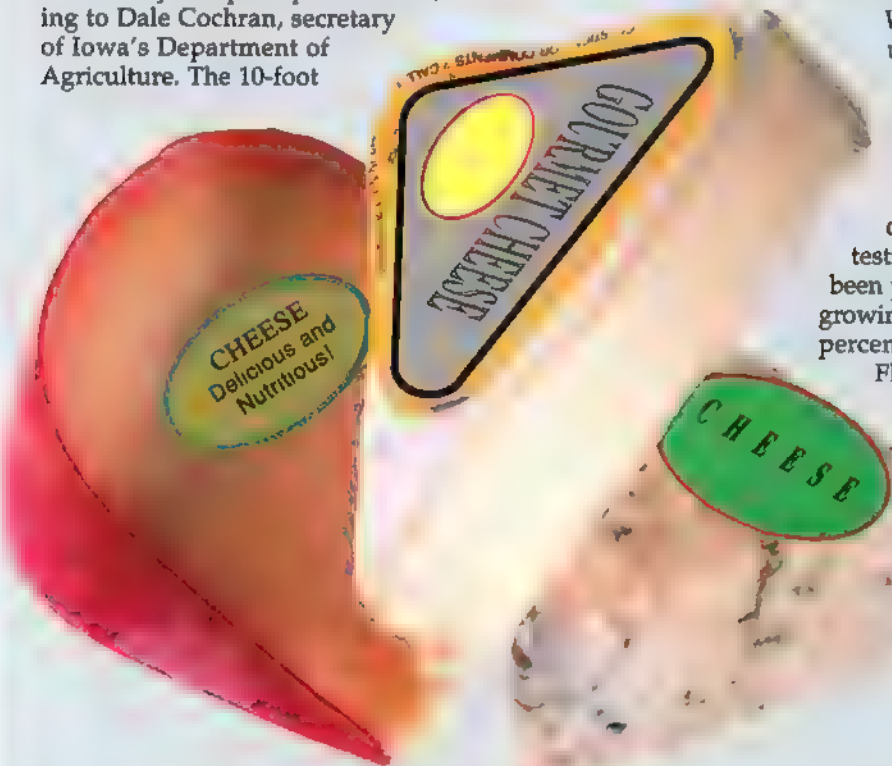
## How to Reduce Your Exposure to Aflatoxin and Patulin

Most people first heard about aflatoxin during the big peanut-butter "scandal" of the 1970s. The hysteria around poisoned peanut butter led primarily to people storing their sandwich spread in the refrigerator after opening a new jar, in the hope that this would prevent cupboard contamination from aflatoxin-induced mold. Yet most experts agree that the source of aflatoxins comes primarily from the field (where peanuts are damaged and infected with *Aspergillus flavus* mold) — not from any subsequent inoculation while on your pantry shelf.

While much of the literature on aflatoxin and patulin looks pretty scary, the real impact in the American marketplace is less threatening. The peanut-butter industry has gone to great lengths to grow and buy quality peanuts. Each peanut is electronically, mechanically, or visually inspected by color so as to discard those that are darkened or moldy. Manufacturers perform rigorous batch testing of the finished butter. Once the peanuts have been pasteurized and the jars filled, the aflatoxin stops growing and the residual aflatoxin is reduced by 40 to 60 percent, according to Leonard Stoloff (formerly of the FDA) in *Mycotoxins in Human and Animal Health*.

Certainly, the U.S. has a greatly reduced exposure when compared with Third World countries, where most of the known aflatoxin deaths have occurred. Despite regulatory problems, inadequate testing, and inspection difficulties, the American agricultural, processing, and marketing industries are far ahead of many countries in preventing aflatoxin-inducing mold. Some very simple guidelines for concerned shoppers will add a considerable measure of safety to your family's diet.

Aflatoxin and patulin are fungal-produced, so it's sometimes easy to spot con-







taminated foods by their moldy surface and discoloration. The first line of defense is to avoid all obviously moldy products. You may recall sifting through a bag of peanuts and finding some greenish or blackened nuts. Don't eat them. Off-colored peanuts are most probably contaminated with aflatoxin-producing fungi. One of the riskier exposures, according to Mary Roach in an article in *Hippocrates* (now *In Health*), is to grind your own peanut butter without inspecting the goobers.

Other nuts and seeds which, according to various textbooks on mycotoxins, have been known to support the growth of the *Aspergillus flavus* mold include: Brazil nuts, almonds, filberts, walnuts, pistachio nuts, and sunflower seeds. Some of these are used to make raw, unroasted, and unheated nut butters, which could greatly increase your exposure to aflatoxin. Another consideration is to avoid cooking oils made from nuts and seeds known to be potentially inoculated with *Aspergillus flavus*, especially unrefined peanut and cottonseed oil.

### Checking Corn Meal and Dairy Products for Contamination

**A**nother major source of mycotoxins is corn meal. The safest way to avoid aflatoxin contamination may be to purchase whole dried corn, visually inspect it for discolored, moldy kernels, and grind your own. When making your own corn meal, Leonard Stoloff recommends "soaking (the) corn in alkali, [which] can remove a sizable portion of any aflatoxin that may be present."

There are some simple guidelines for protecting yourself from dairy and meat products made from cows fed with aflatoxin-tainted corn. Among the greatest foods at risk, according to the *WSJ* article, are milk, cheese, liver, and kidneys. Strict lacto-vegetarians are already protected from these possibly contaminated sources. Since it's unreasonable for the rest of us to raise our own dairy and beef cattle, we are at the mercy of state- and Federal-government inspection programs. But there are ways to protect ourselves in the supermarket.

The mycotoxin first affects the liver, kidneys, and colon of any animal feeding on contaminated grain, so eliminate all liver, tripe, and kidney meats from your diet. Consider substituting soybeans (they're relatively resistant to *Aspergillus flavus*) for as many milk products as possible — such as soy milk, soy "cheese," and tofu and tempeh as meat substitutes. Use wheat flour in place of corn meal wherever possible (for example, in tortillas, breakfast cereals, and bran).

Certain cheeses pose another hazard beside the possible use

of contaminated milk to make the cheese. Smith and Moss advise against eating spoiled

cheese: "In the primary ripening of Gouda cheeses in warehouses, fungal contamination of the outer rind showed significant diffusion of sterigmatocystin [a mycotoxin produced by a number of *Aspergillus* species] into the outer rind. However, the washing process prior to final coating for commercial sale will normally remove most of the toxin. In practice, mold-spoiled cheeses should not be consumed."

Less well-known is the susceptibility of sweet corn to aflatoxin-producing mold. The visual symptoms to be wary of are any physical damage or a greenish-yellow spore-mass produced by the mold. An ear of corn showing moldy growth should be discarded.

### Moldy to the Core

**W**ith apples, the symptoms of patulin are quite similar to those of aflatoxin. If you've ever cut an apple in half to find a moldy core, you've stumbled across the patulin-producing penicillin mold. This mold most frequently grows on apples after they've fallen off the tree. As with sweet corn, you should discard the entire apple.

Apple juice is a different story. I called six large and small "natural" and "organic" juice manufacturers, five in the state of California and one out-of-state, to inquire about their testing. In three cases, they had never tested for patulin. Two companies, one of which did the lab work for another, maintain a regular lot-by-lot testing of apples for patulin, paying special attention to organically grown apples.

The state-wide organic certification program for California, the California Certified Organic Farmers, has no provisions for testing apples or apple juice for the penicillin mold or the patulin toxin, although standards for processors are being considered. The organization's mandate is to certify the fruit as free from chemical residue due to cultivation, but it doesn't take into account how the fruit is processed. To protect your family from patulin in apple juice, buy locally produced juice from a grower that tests for patulin. You can call most any juice company and ask them about patulin. They all were very courteous and direct when I called.

Many governmental and environmental regulations appear to give the impression that we can legislate a risk-free life. But life isn't risk free. As far as patulin and aflatoxin go, I quickly discard any food that's the least bit moldy. And I grow organically as much of my own food as possible. Having lessened the possibility of food contamination, I just, well, dig in. Happy and safe eatin'!



# Brundtland's Legacy:

## Can Corporations Really Practice Environmentalism While Fattening Their Profit Margins?

Nobody pays much attention to the chandeliers at the Intercontinental Hotel in London. (They're made of small plastic cylinders glued together, like bundles of toy flutes stuffed with light bulbs and hung upside down to dry.) Nor does anyone notice the sliding wall panels, the monochrome carpet, the filtered air, the color of the tablecloths, or the seven plates at every lunch-table setting. To draw attention to any of this would not only be irrelevant, but also impolite. Who comes to hotel conference rooms for the ambience?

But last April 24 at the Intercontinental, when the subject was corporate environmentalism, a little talk of ambience would have helped a great deal. About 200 middle-level executives from mainstream corporations throughout Europe—including the Shell United Kingdom oil company, ICI (the largest British chemical manufacturer), Volvo, IBM Europe, Spanish National Electric, McKinsey, and even a branch of OPEC—came to sit at those tables and learn whether a softening of the corporate heart towards the environment would weaken their bottom lines. This "Industry and the Environment" conference, sponsored by the *Financial Times* (Britain's peach-colored equivalent to

*The Wall Street Journal*), was only one of dozens on the subject in 1990. The *Times* charged attendees 400 pounds sterling (about \$700) admission each for their conference, where a dozen or so politicians, industrial chairmen, and stock analysts each offered their corporate equivalents of "things to do to save the Earth."

Like mainstream corporations themselves, the corporate-environmentalism movement is rife with byzantine intrigue; its rhetoric is full of coded distinctions that only occasionally affect actual practices. That's one reason why reports about it differ so dramatically. *Fortune* prints glowing descriptions of companies like DuPont (whose chairman, Edgar Woolard, makes speeches calling for industry-wide environmentalism) and McDonald's (which printed a photograph of the Earth on its placemats, next to an impassioned defense of its polystyrene clamshell containers). On the other hand, writers like *The Nation* columnist Alexander Cockburn note the seduction of some environmental groups by corporate "lawyers, lobbyists, and fund raisers," who cynically

manipulate their companies' public images. To many people, corporate environmentalism seemed especially venal this Earth Day, when many companies rushed to sponsor the event, as if it were the Olympics or the Super Bowl. Of course, the movement works solidly within the traditions of capitalism, fueled by people who are trying to hang on to the profit motive (or at least their paychecks) and keep their ideals intact, too.

Still, there's an undeniable sincerity among many corporate environmentalists. Some of their work has had genuine effect: Monsanto cut its toxic air emissions dramatically in the last two years. Pacific Gas & Electric, the nation's largest power utility, completed construction of its

last nuclear power plant in 1985 and has since appropriated hundreds of millions of dollars for energy-conservation research. More examples exist, but a glib list would be misleading.

To judge the value of any individual case you have to look closely, without assuming you'll find either heroes or villains. In some cases, you'll find both. Most likely, you'll find turmoil. Most companies are still planning environmental improvements, participating in solemn discussions in large hotel banquet rooms. Few are looking at the lunch-table settings, wondering whether, for instance, there could be three plates set down instead of seven.



BY ART KLEINER



## Balancing Environmental Needs With Economic Gain

If any single person has made environmentalism palatable among corporate people worldwide, it is Gro Harlem Brundtland, a 51-year-old Norwegian who is arguably one of the canniest, most idealistic politicians alive today. She chaired the international commission which, beginning in the mid 1980s, popularized the catchphrase "sustainable development." The official definition of that phrase means "meeting the needs of the present" without compromising the same ability for future generations — in other words, making sure that human activities today don't destroy human habitat in the future. Corporations understood the phrase more broadly. In the words of one chemical-company manager, it means "that you can't have environmental quality without economic growth, and you can't have economic growth without environmental quality."

Many environmentalists argue against that premise. Some say that the Brundtland Commission didn't mean to imply it. But it was, in a sense, built into the group's purpose. Instigated by the United Nations, the group was officially called the "World Commission on Environment and Development" for its first three years. After 1987, when it released its report *Our Common Future* (for review, see p. 69), it



took the cheery name "Centre for Our Common Future." At first, the commission focused on healing the split between environmentalists and the Third World. In the 1970s, wealthy countries began to realize that the world was fast approaching its environmental limits. To many politicians in Africa, Asia, and South America, this idea was a rhetorical weapon, enabling rich "environmentalists" to keep less-developed countries impoverished. The new commission was supposed to envision a world where living standards and environmental quality continue to improve. "Could such a world exist?" they wondered. "What would it look like?"

When the U.N. secretary-general asked her to head the commission, Mrs. Brundtland was the Prime Minister of Norway and the nation's former minister of the environment. She was probably best known for promoting women in government. *People* magazine compared her to Hippolyta, Queen of the Amazons: "She is not content, like Margaret Thatcher or Indira Gandhi, to be an-

other lone, formidable woman rising to prominence in a man's world; she is bent instead on taking the rest of her sex up the mountain with her."

An even-tempered, soft-spoken socialist married to a member of the opposition (Conservative) party, Mrs. Brundtland was known even then for her gift for rapprochement (she mediated between U.S. and U.S.S.R. diplomats) and for her ability to produce results. She set a different tone from the typical United Nations-office culture, a labyrinthian bureaucracy where status depends on such perks as getting assigned to Paris or New York, instead of Nairobi or New Delhi. Instead, the Brundtland commission held almost two dozen open public hearings in India, Norway, Brazil, Canada, Zimbabwe, Kenya, Russia, and Japan. Hundreds of people told the panel stories about their environmental and economic lives. The excerpts published in *Our Common Future* take on a town-meeting quality as each paragraph tells a com-

elling story — the pollution-caused asthma of a Japanese activist, the frustration of an African unemployment counselor, the technological optimism of a Soviet scientist.

"Other international commissions had never traveled around and listened to people," says Lloyd Timberlake, one of the editors of *Our Common Future*. "I think it changed the viewpoint of a lot of the members. They got educated as they went along."

The commission's final report is an environmental prescription for governments, with specific suggestions on mandatory energy-efficiency measures, methods for tracking clear-cut forests, and international financing of environmental safety measures.

These carefully wrought political statements had little impact when compared with "sustainable development." The term excited

free-market politicians and business people

# Monsanto

with its assumption of a free lunch: Corporations could safeguard future generations, preserve the planet, and continue to prosper. In the United States, the chemical industry immediately picked up "sustainable development" as a catchphrase. In Canada, the government set up councils with people from industry and environmental groups to talk about responding to the Brundtland proposals. In England, Margaret Thatcher began her well-

known series of "green" speeches in 1988, crediting the Brundtland Commission with raising her consciousness. In turn, executives at ICI and Shell have said privately that the Iron Lady's stance made it safe to embrace environmentalism in their companies.

### Insider's Environmentalism

For years, companies throughout the world were full of closet conservationists waiting to enlighten their organizations from within. They still won't speak out beyond the firm's walls, but they increasingly make their presence known. A senior executive in a multinational oil company proudly told me that his firm is planning to eliminate all pollutants in its air and water emissions. I was surprised. His company had well-known arguments with environmental groups (albeit with less public attention than Exxon). "That's exactly what Greenpeace recommends," I said. He drew himself up and replied, a bit testily, "Well, I have been a member of Greenpeace for years."

Environmental change nearly always starts with the individual. Dow Chemical engaged in bitter fights with environmentalists during the 1970s and early 1980s. I've talked to several executives from that company who felt originally that they were up against a group of opportunistic, hysterical dilettantes. Coming into direct contact with environmentalists, especially over negotiating tables, they gradually became impressed with the seriousness — and technical credibility — of their oppo-

nents. That's what Dow's executives say privately. Publicly, the company still rarely gives an inch on admitting past technical mistakes. Many managers, especially in chemical and oil companies, were trained as chemists or engineers: As the technical quality of information about pollutants became more rigorous, they were more likely to take the dangers of, say, global warming more seriously.

Admittedly, people who try to radically change corporations from within are often stymied. Greenpeace's London office received a job application this year from one Shell UK engineer who had joined the company directly from Cambridge University, with hopes of reforming its emissions practices. "He found that his ideas were blocked from the top, and if you held an attitude of environmentalism, you wouldn't get to the top," said Paul Horsman, director of Greenpeace's UK Toxics Campaign. All this in a corporation whose leaders have made repeated speeches about the importance of environmental concerns, and whose "Better Britain" campaign is one of the most prominent marketing events in the country. Shell, in fact,

moved earlier than any other large British company to bring environmentalism into its decision-making, according to Environmental Data Services Ltd., an independent agency that tracks corporate polluting. Yet, at the same time that the Better Britain campaign was in full swing, Shell was paying Britain's largest-ever fine for environmental damage, for an oil spill in the Mersey River.

Part of Shell's problem is that it's too big and diffuse. It's made up of several hundred companies scat-

tered across the globe, and most of them make decisions

independently. A widespread tradition of protocol makes it especially hard for Shell managers to criticize their peers. If Shell U.S. has a refinery fire, or is accused of selling a pesticide that makes farm workers sterile (as happened recently in Costa Rica), a Shell executive in another part of the concern can only look on. In most cases, company insiders have less influence than outsiders. Even so, the outside world sees only one "Shell," or one "Exxon," or one "Dow Chemical," and judges the entire outfit by the actions of one of its parts.

Environmentalists within such a company are trapped in a double bind.

They feel responsible for policies that scar the environment, but can't change them. The only effective approach they have is gradually, arduously building a constituency from within, proving to the hard-liners that the new practices would save money or even open new markets. Only top executives have the clout to proclaim a widescale change in attitude. As International Chamber of Commerce President Hugh Faulkner said recently, the single most important factor in corporate environmentalism is whether the chairman and the board members are convinced that it works. But even top executives can change habits only slowly. They can start new projects and stop old ones by shunting money back and forth, but they can't make people act more consciously — except by example.

As business planner Peter Schwartz points out, most successful executives go into business not so much to earn a salary as to do things: build that refinery, start that project, sell that product, make that deal. To be denied the money to complete a project is emotionally devastating. If top executives can feed money to ecologically appropriate projects, that makes other executives jump on board. Otherwise, environmentalism is seen as running against the "do things" impulse. It counsels, instead, "stop doing." That's a message executives don't want to hear. In order for corporate environmentalism to take hold, resistance must change. And that's the value of Brundtland's legacy — it removed the underpinning from corporate resistance.





## The Carrots and Sticks of Corporate Environmentalism

By themselves, the Brundtland Commission's ideas would have had virtually no impact on corporate environmentalism. But a half dozen other institutional reasons for change have emerged in the last few years.

The most obvious force for change is a fear of lawsuits. In the past, with their performance judged by quarterly results, managers have been irresistibly tempted to cover up pollution problems and tell the next executive up the ladder, "I've taken care of this and we don't have to worry about it any more." The catastrophes of the 1980s put an outrageous pricetag on that attitude.

Environmental consultants at SRI International, for instance, point to the 1984 Union Carbide plant explosion in Bhopal as a seminal demonstration — not of the devastation possible from an ecological disaster, but of the threat to a company's existence. After Bhopal, Union Carbide's stock fell dramatically; the company cut more than 4,400 employees and narrowly missed becoming a takeover target. At the *Financial Times* conference, a young lawyer named Brad Gentry recounted case after case of lawsuits and cleanup fines. Executives who knowingly authorized illegal pollution, he said, would increasingly face a prison term. His final warning hushed the crowd: "There has been a sea of change. The arguments traditionally used by industry, 'We don't know that it's not safe' and 'It's too costly,' are falling on deaf ears."

*Companies grudgingly adopted changes to meet environmental-quality restrictions, and then discovered that in the long run, the changes saved them money.*

Some panelists at the *Financial Times* conference reveled in the second reason for change — the chance to net higher profits by selling environmental cleanup services to other corporations. There are more than 6,500 waste-management companies worldwide. They employ 250,000 people in West Germany alone. Ten years ago, the companies would have been part of a tirade against the regulations making all that cleanup necessary. Now, the regulations are cause for nationalistic boosterism. Britain, said Mr. Roger Hardman, a financial analyst with James Capel, a London-based brokerage firm, wasn't getting as much of the business as "some countries that we tend to think of as, well, not quite up to our standards. Turkey, for example. When Britain gets beaten by Turkey in a new industrial area, I think you'll agree we're a little off what we aspire to."

As a hot new industry, waste management has a major drawback (besides its historic flirtations with organized crime): It makes its money not from generating new wealth, but from cleaning up old messes. It was heartening to hear another panelist, Aloisi de

Larderel, stand up and challenge Mr. Hardman directly. Mme. de Larderel is the director of the Paris-based Industry and Environmental Office of the United Nations Environment Programme, making her the environmentalist ambassador between the United Nations and the world of mainstream corporations. Like Gro Brundtland, she's a plain-speaking woman. She reasoned that if factories could clean their pollution problems at the source, before pollutants ever reach a pipeline or smokestack, then "maybe not tomorrow, but the day after tomorrow, the waste-management industry might be a bad business."

Mme. de Larderel was alluding to the third impetus behind corporate environmentalism. Companies grudgingly adopted changes to meet environmental-quality restrictions, and then discovered that in the long run, the changes saved them money. 3M, the widely diversified St. Paul-based manufacturing concern, estimates it has saved hundreds of thousands of dollars since the mid 1970s by tackling pollution control earlier in the manufacturing process and recycling waste chemicals.



Another factor makes companies more willing to change old habits. The rise of the "quality circle" movement had nothing to do with environmentalism — it was a technique refined in Japan in the 1950s and 1960s, where employees and managers worked together to analyze and improve the general quality of production lines. Though it was inspired by two American productivity experts, W. Edwards Deming and Joseph M. Juran, the movement was ignored in the West until the 1980s. Now, as its influence spreads, it's beginning to affect environmental safety. At one ICI dye-producing factory in France last year, a quality circle of shop-floor workers rewrote their safety manuals, eliminating one of the flammable pollutants that the plant was dumping into a local river. "Their mates work in the fire department next door," said a British consultant who had visited the plant, "and they don't want them to blow up." If environmentalism is a necessary byproduct of productivity, most managers are happy to accept it.

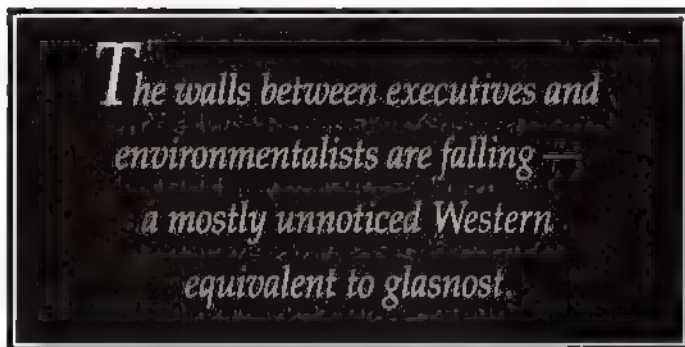
A fifth impetus for change is competitive advantage. Many environmental-quality programs in the chemical business, for instance, involve high up-front costs that only large, mainstream companies can afford. Tough environmental standards mean that a start-up chemical company, for instance, has a much harder time entering the business than it would have had 20 years ago. It's not surprising, then, that lobbyists from the largest American chemical companies have begun to ask for more stringent air- and wa-

ter-quality regulation. They would not say so overtly, but it might keep out new competitors.

"Green consumers" who boycott (or merely avoid) products based on their environmental quality are another emerging catalyst for corporate change, although marketing experts can't yet prove that market share (the percentage of customers "held" by a company's product) is influenced by boycotts. Nor can they prove a lack of influence. You can expect to see growing numbers of products labelled as "environmentally safe," but not because marketers think that consumers really care. Mainstream product marketing is increasingly competitive, and any small dent is worth the trouble of a changed label.

### Corporate-Environmental Success Means Using Less

It all sounds so persuasive — and yet oil spills, chemical dumps, and deforestation continue. Even the companies that seek the promise of sustainable development don't always realize the catch: It means living more wisely, both as a company and as individuals. "Living standards that go beyond the basic minimum are sustainable only if consumption standards everywhere have regard for long-term sustainability," argues the Brundtland report. "Yet many of us live beyond the world's ecological means." In other words, the logical extension of environmentalism is a kind of asceticism — a willingness to live better with fewer goods and less energy. No corporation



(that I'm aware of, at least) has embraced that idea entirely. Corporations define their success as selling more goods and services to more people.

In this context, using fewer luncheon plates at the *Financial Times* conference would only be a first step. Irving Mintzer, Senior Research Scholar at the University of Maryland's Center for Global Change, claims that it may not be possible to raise every human being's standard of living to the point where we can all

eat beef; there simply isn't enough grazing land on the planet. But even if McDonald's could abandon polystyrene, could it abandon beef?

"We need now to think in terms of systems," Mme. de Lauderel said at the conference. "It's more than the need to improve the clean manufacturing process — because with clean processors, we can produce dirty products. We should not think of merely producing a car which is less gas-consuming, or less benzene-consuming. We should think of transportation and fulfilling the transportation need, in order to design new transportation systems."

The comment slipped by, almost unnoticed, but it

represents the great hope of corporate environmentalism: For all their vested interests and self-indulgence, corporations are far more resilient than, say, governments. The early 1990s are a time when many top corporate leaders are insisting on a change of habit, if only because spreading decision-making among more people seems to make a

company much more effective. That can only make corporate environmentalism easier to achieve.

It's instructive to travel from the offices of Greenpeace to the offices of Royal Dutch/Shell's group planning department (responsible for keeping Shell executives informed about outside events, like the rise of environmentalism). People at both the corporation and the non-profit organizations are equally congenial, and equally well informed about the issues. The big differences are in amenities. Shell staffers drink from a vending machine which dispenses a small plastic cup filled with coffee. People at Greenpeace take turns tending a coffee machine, and wash their cups in the sink. In most corporations, taxi rides are a minor inconvenience; in many non-profits, they're a luxury.



There are, in effect, two cultures in our society. One travels rarely by plane. The other saves energy by only using the Concorde when necessary. Corporate life is awfully seductive. At a retirement party for a Royal Dutch/Shell managing director, someone asked what he would miss most. "The person who comes to meet me at the airplane," he said, "and takes care of everything."

In the past, cultural differences have kept denizens of both worlds from communicating. Those of us who moved between them developed a peculiar sort of doublethink, and a constant feeling of looking over our shoulder, wondering whether we'd let an inappropriate comment slip. Now the walls between executives and environmentalists are falling — a mostly unnoticed Western equivalent to glasnost, with just as many uncertainties. However it plays out will be the most fascinating business and environmental story of the next decade.

*Journalist Art Kleiner was an editor of the Whole Earth Catalog and CoEvolution Quarterly (1980-85), and has written for the New York Times Magazine, Whole Earth Review, and 7 Days. He has also taught at New York University. Last year, Art began working on a book called The Age of Heretics, to be published by Doubleday. Research for the book led him to suggest this series for GARBAGE, which will look at the complexity of the issues behind corporate environmentalism.*





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## From Changing Oil to Changing Diapers

### PRODUCTS

#### Water-Saving Washer

If you're in the market for a washing machine — and the wringer-

washer we featured in our Jan-Feb issue was a little too rustic — try a front-loader.

Front-loading clothes washers have always been more energy efficient than top-loaders. But WCI Major Appliance Group, which makes Gibson and White-Westinghouse brands, has recently made a good thing even better. Their front-load washers now use about *one-third* the energy that a good top-loader uses.

Because of their tumbling action, front-loaders need less water to get clothes clean. And because 90 percent of the cost of doing the wash comes from energy to heat the water, you save not only water and energy, but also money. The American Council for an Energy Efficient Economy lists the annual energy cost of running one of these machines at a scant \$22, assuming you do eight loads of laundry a week. Even among the most miserly top-loaders, the annual energy cost averages \$65. The \$43 translates into about 500 kilowatt-hours saved, a smaller puff of air pollution, and 3000 to 7000 gallons less water diverted from its natural course. A bonus: The machines use one-third the usual dose of suds and bleach.

Standard-size front-loaders with excellent efficiency ratings include the Gibson WS27 M6-V and the White-Westinghouse models LT00L, LT250L, LT150L,

LT800, and LT700. Prices range from about \$660 to \$760. If they're not available near you, call White-Westinghouse at (800) 245-0600.

#### Improved Disposable Diaper

In ten years, "diaper guilt" will probably make it into the *Diagnostic and Statistical Manual of Mental Disorders*. Diaper guilt results when parents learn of the environmental evils of disposable diapers, but are unable to break free from the insidious grip of convenience.

Nevertheless, many parents are turning to cloth, one reason being that cloth-diaper accessories are popping up like dandelions on a landfill. There are now pants and covers that wrap around the traditional cotton diaper, replacing pins with Velcro closures, and containing leaks with cotton, terrycloth, and wool.

Until recently, however, no one we knew had addressed the "occasional disposable" situation. This problem arises when cloth-diapering parents take the baby on a trip. Faced with carting dirty cloth diapers around, they turn to an occasional disposable.

Recognizing the occasion as a

**Front-loading washers save energy, water, money.**

**Change the pad, but keep the diaper.**



DON BETTS/HORIZON



moment ripe for a relapse of diaper guilt, one company has come up with a modular system of diapering: When you need a disposable, you use a Dovetail, a disposable pad much like a sanitary napkin, instead of a plasticized, elasticized, jellied diaper. The pad fits inside a Nikky, a wrap-around diaper cover that comes in both terrycloth and a patented cotton fabric. Family Club House, Inc., makers of Dovetails, also makes the Terrytail, a washable, contoured, terrycloth pad that fits inside a Nikky.

While Dovetails soothe diaper guilt, they'll probably create their own load of environmental angst. The bulk of the pad is fluffed paper, but the sleeve is rayon: Its cellulose is biodegradable, but among the toxic pollutants released into the air and water during rayon processing is millions of pounds of carbon disulfide, a hazard to the nervous system. Parents, gird yourselves for rayon guilt.

Look for Dovetails, Terrytails, and Nikkys at natural-food stores, diaper services, and children's specialty stores. Mail-order prices: Dovetail disposables, \$33 for 99 small, or \$44 for 100 large; washable Terrytails, \$30 for 12 small, or \$36 for 12 large. Under \$50, shipping is \$4.95; \$50 to \$100, \$6.95. For information on Nikkys, request the free catalog. Family Club House, Dept. GM, 6 Chiles Ave., Asheville, NC 28803; (704) 254-9236.

### Permanent Oil Filter

If you're a weekend auto mechanic, and if you own one of those rare cars whose oil filter you can change without removing the fenders, there may be an environment-friendly oil filter for you.

By now, many do-it-yourselfers have found a recycling depot where they can take their used engine oil. But the filter remains a disposal problem. It holds residual oil as well as an oily sludge of dirt and perhaps even bits of metal. The filter housing is usually aluminum with an occasional plastic part. (The filter itself is paper.)

The U.S. Environmental Protection Agency doesn't rate used oil as hazardous waste, so it doesn't regulate the disposal of used filters. The U.S. Census

Bureau estimates that drivers of cars and light trucks go through nearly 900,000 oil filters *each day*. Pretty crude ... but there's a slick alternative. System 1 designed a permanent oil-filter system for racing cars, then realized that environmentalists might also be interested in a filter that you take off, wash in soapy water, and screw back on.

The filter is 138 square inches of pleated, woven stainless steel. The top of the aluminum housing screws off so you can look at the filter without disconnecting the housing from the engine. There are six inserts that adapt the filter to most cars, as well as one for marine engines. (So when you trade in the Chevette for a speedboat, an \$8 part allows you to keep your \$80 filter.) Two inserts, each covering a big family of cars, come with the initial purchase.

For exact prices, to locate a dealer, or to order by mail, contact System 1 Filter Systems, Dept. GM, 1822A E. Main St., Visalia, CA 93291; (800) 554-3533; (800) 231-9137 in California.

### Shampoo Without the Bottle

Tom's of Maine brand shampoo is rare among "natural" shampoos, because it's not preserved with methyl paraben or other petrochemicals. Some people still bristle, though, at its plastic bottle.

Now we've found a shampoo with minimal packaging. The Bar of Shampoo could conceivably be improved — you could scoop it out of a barrel at the store and take it home in your own box. But we won't split hairs. The bar is packaged in a layer of moisture-retaining paper and a cardboard box. One bar lasts about as long as a large, 24-oz. bottle of shampoo.

J.R. Liggett makes the bar by hand, the way people have made soap for centuries: combining oils (in this case, vegetable and herbal oils) with sodium hydroxide (lye). The resulting bar is a pearly gold color, with a



DON BETTS/HORIZON

**Bar shampoo minimizes packaging.**

warm, faintly spicy smell. It's just a little squishy.

Although some hair types in our office disagreed, the bar purports to eliminate the need for conditioner. Mr. Liggett explains that his bar doesn't strip hair's natural oils as do the petroleum-based detergents in regular shampoos.

The Bar of Shampoo is available in East Coast health-food stores, the Wisconsin area, and in a few Los Angeles-area locations for about \$5; for mail-order, send \$6.25 (\$10 for the box) to J.R. Liggett, Ltd., Dept. GM, Route 12-A, RR2, Box 911, Cornish, NH 03745; (603) 675-2055.

### Clustered Recycling Barrels

Ever carry a newspaper or an empty soda bottle all over town, just so you could drop it in your recycling bin at home?

Towns, universities, and parks are noting our willingness to recycle, and

are setting up miniature recycling stations in public places. Not only do they serve the public, but they also decrease the amount of garbage that has to be buried in an expensive landfill.

"Clusters" are made to serve this purpose. Two to four barrels hug a central post emblazoned with the recycling symbol. A customized green label on the top of each white lid indicates the type of waste that people should drop through the hole. There is a steel bar that can be added to lock the cover on, and for newspapers, a special cover fitted with a rain-resistant slot.

The steel barrels are encased in heavy-duty plastic "lumber" made from recycled milk jugs; using recycled products is an essential part of recycling.

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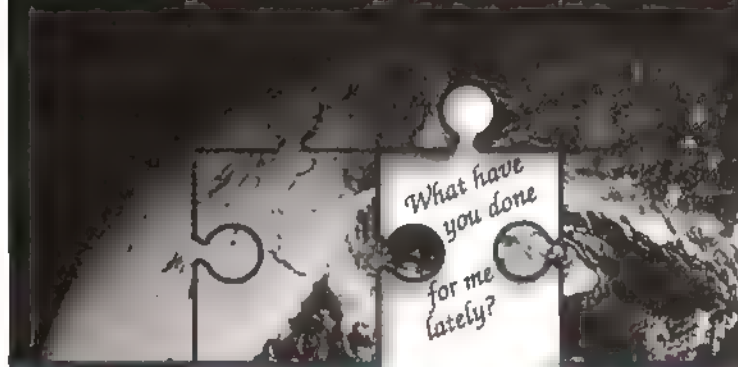
#### Discordant Harmonies

by Daniel B. Botkin. 241 pages. Oxford University Press, Customer Service, 2001 Evans Rd., Cary, NC 27513. Hardcover, \$21.45 ppd.

Daniel Botkin, biologist and mythbuster, argues that our metaphor for nature as a complex but predictable machine is a leftover from the Industrial Revolution, and should now be replaced by a more flexible model.

The outdated, mechanical view holds that if we give space and protection to an endangered species — elephants, for example — they will multiply to a point where the environment can sustain them. But as Mr. Botkin relates, when this theory was

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## KEEPERS

applied to Tsavo, a Kenya national park, it backfired with grievous consequences for the land and wildlife. The elephants, given 5,000 square miles, plentiful water, and protection from poachers, experienced a population explosion. Believing they would eventually reach a "natural ecological climax," or a state of stability, park managers decided not to shoot the animals, but to let drought and vanishing vegetation thin the herd. The drought that eventually came was so severe that the elephants destroyed all the vegetation, leaving a scar of brown desert amid Kenya's green vegetation.

With this narrative, Mr. Botkin illustrates his discordant harmony:

*Botkin believes  
that this is no time  
for us to bow out  
and leave nature  
undisturbed.*

Nature is more random than we're accustomed to planning for; different species require varying-sized habitats in order to endure nature's whims; and there is no such thing as an ecological climax, only continual change. He writes that because humans have influenced dramatically the current state of the world's land, flora, and fauna, this is not a good time for us to bow out and leave nature "undisturbed." Rather, it is time we studied the requirements of other species, or "themes," in order to prioritize the ones we want to salvage, and minimize the number that our presence inevitably squeezes out.

"There are many themes in nature's symphony, each with its own pace and rhythm. We are forced to choose among these, which we have barely begun to hear and understand," Mr. Botkin writes.

Mr. Botkin calls for a commitment to the study of the nuances of our natural world. He writes that the



wide use of technology, especially computer modeling, will enable us to account for nature's randomness, even as we plan its future. For anyone left cold by the view of nature as a cranky mechanical contraption, Mr. Botkin presents an alternative that appeals to both the intellect and the instinct.

—Hannah Holmes

### Our Common Future

by The World Commission on Environment and Development. 400 pages. Softcover, \$10.95 (shipping varies)

### Signs of Hope

by Linda Starke. 208 pages. Softcover, \$8.95 (shipping varies). Oxford University Press, 2001 Evans Road, Cary, NC 27513-2009.

Oxford University Press is one of the rare publishers that doesn't rush its books out of print, so *Our Common Future*, the Brundtland Commission's report on melding economic development with environmental protection, will likely be available for some time (see Brundtland's Legacy, pg.50). It's a prescription for change, and if (admittedly) it reads like a prescription in places, it's also a remarkably comprehensive guide to environmental concerns around the world. The book is a compact educator — on the effect of international poverty on environmental quality, on the spawning of deserts, the possibilities of energy efficiency, the emerging strategies for environmental protection in cities.

*Our Common Future* is the official document of sustainable development — the premise that economic growth can't exist without environmental quality, and environmental quality can't exist without economic growth. The editors have also made it a reasonably accessible book by peopling it with real voices taken from the Brundtland Commission's public forums on environmentalism and economic growth. Anyone needing to come up to speed quickly on international environmental issues will find it a readable and reliable reference.

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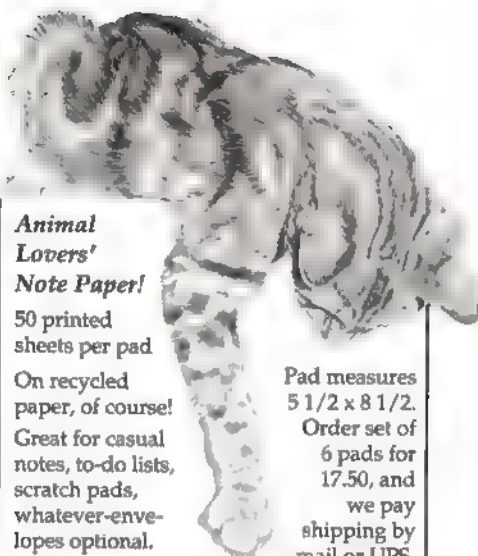
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you a behind-the-scenes view of the Commission at work and the people who are creating environmental policy. That's why *Signs of Hope* is so valuable. Written by Linda Starke, the Worldwatch Institute-based editor of *Our Common Future*, this new book looks at what has happened in the three years since the Brundtland report appeared. *Signs of Hope* is a scorecard of conferences, proposals, initiatives, news coverage, and some actual deeds—most of it unrecorded by the American media.

*Signs of Hope* reports, for instance, ideas for paying for worldwide environmental protection—from changing accounting methods so

**OUR COMMON FUTURE** is a guide to environmental concerns around the world.

that environmental quality becomes part of the bottom line, to former Indian Prime Minister Rajiv Gandhi's proposal for a "planet-protection fund." Canada's round tables, where environmentalists, industrialists, and government officials meet to hammer out their country's future moves toward sustainable development, are covered; so is the Kenyan "Green Belt" movement, a grass-roots effort that has planted millions of trees.

To reveal the machinations behind the political smokescreen takes more than diligent research. Ms. Starke extracts significance from the technical minutiae of environmental regulation. Its clear-eyed comprehensiveness is what makes *Signs of Hope* so valuable. If you've ever wondered idly why no one has thought of a doable solution to a particular environmental problem, you'll probably find here that someone has, and why it's taken so long to bear results.

— Art Kleiner



## EDUCATION

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As our mail regularly attests, school children are becoming increasingly vociferous about our ever-growing garbage problems. Middle-school teachers wishing to tap their students' interests by incorporating waste management lessons into this year's curriculum will find that the KAB poster provides an innovative way to track the processing of America's trash. The colorful 22"-by-30" poster contains engaging illustrations, charts on municipal-wastestream composition, and comprehensive explanations of our management options — source reduction, recycling, composting, waste-to-energy incineration, and sanitary landfilling.

Unlike some other educational tools that solely preach reuse, reduction, and recycling as panaceas for our garbage crisis, the KAB poster stresses the importance of an integrated approach to waste management. The authors note recycling's importance, but they also detail real-world economic obstacles to setting up municipal programs, and stress the necessity of establishing markets for recycled products.

Suggested topics for class discussion ask students to brainstorm ways that they can reduce their own waste, or to consider why it's important to control incineration emissions. The poster provides guidelines for researching the economic feasibility of implementing a school recycling program, and offers instructions for setting one up. How-tos for constructing a model landfill and building a compost pile are also included.

Civic organizations, local governments, and businesses conducting workshops on waste management will find the poster useful for illustrating presentations. Sources for more information on specific waste-management issues are also listed

—Ginia Bellafante



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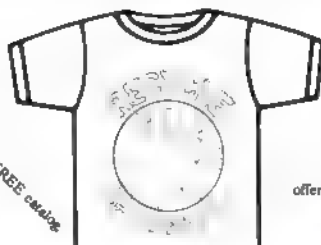
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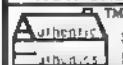
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# Trendy Tricksters are Monstrous Throwaways

**H**olidays have become marketing extravaganzas. Halloween is a case in point. Making kids' costumes used to be fun, creative, and a way to recycle odds and ends. Torn sheets became little ghosts; an old blazer, ripped jeans, and ingenuity could turn well-groomed Junior into a ragamuffin or a menacing thug. Today, Halloween costumes are purchased. Collegeville, a leading manufacturer, produces a staggering three to four million synthetic costumes each year. Typically woven with polyester, polysatin, or some other synthetic

blend, the costumes come ready-made, ready-to-wear, and (after one night) ready-to-toss.

It wouldn't be so bad if costumes were re-used from year to year. But one-half of all Halloween-costume sales are tied to the TV show, video game, or movie of the moment. From 1986 to 1988, the gruesome *Nightmare on Elm Street* series gave us the Freddy Krueger look. Now, Teenage Mutant Ninja Turtles and the Simpsons reign supreme. Fad-specific costumes have made the tried-and-true cowboy or pirate look a thing of the past.

Richard Tinari, general sales manager of Rubie's,

the nation's largest Halloween-costume maker, tells us that although parents like to think costumes will be worn again, "it just doesn't happen." No kid wants to be yesterday's news.

Are discarded costumes adding a big chunk to the wastestream? Hardly. But consider *Forbes* magazine's recent cover story on the buying power of kids aged four to twelve. While "economic growth is crawling along at two percent," *Forbes* reported, "spending on and by kids jumped an estimated 25 percent last year, to \$60 billion." Indulging kids with throwaway fads may not be the best way to encourage responsible consumer behavior.



**Last year's Freddy Krueger  
is this year's Teenage  
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# Privately Remaking a Midwest Ecosystem

**W**hen Midwestern farmers first plowed under prairie plants and cleared fields along straight lines of forest, they weakened the rich soil and increased its vulnerability to erosion. Years of intensive agriculture drastically altered the forested wetlands and prairie surrounding communities like Albany, Indiana. Now, Paws Inc., the licensing company of the Garfield cartoon-creator Jim Davis, is harnessing profits and government funds to turn tired farms and woodlots into the complex ecosystem that predated farming.

In 1981, contractors sowed seven acres of Albany's old farmland with prairie fauna. Last year, workers carpeted 41 acres with grasses and wildflowers. To replenish five acres of drained wetlands, federal employees built dykes to retain water. Soon, Canada geese moved in, but it's too early to tell whether the marshes' complex food web can be fully restored.

When all 500 acres are replanted in 10 years, Paws hopes to add native flora and fauna that have nearly disappeared from Albany's landscape: Species of orchids and honeysuckle, wild turkeys, pheasants, even buffalo may one day share an ecosystem with Mr. Davis' rotund, orange cat.

—Hannah Holmes



**Oak seedlings set this spring herald the return of an upland forest.**